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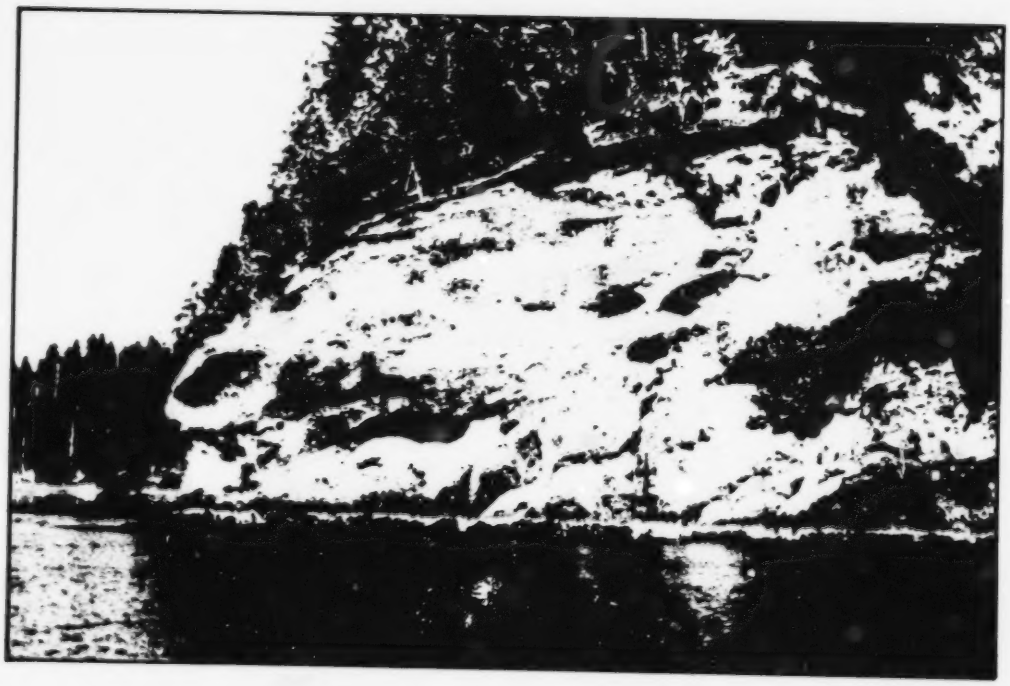
STRATIGRAPHIC INVESTIGATIONS OF THE CRETACEOUS QUEEN CHARLOTTE GROUP, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA

J.W. HAGGART



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Cover

Interbedded cobble conglomerate and sandstone of the lower part of the Honna Formation, Conglomerate Point, Cumshewa Inlet, Queen Charlotte Islands.

Critical Readers

T.P. Poulton
J.A. Jeletzky

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STRATIGRAPHIC INVESTIGATIONS OF THE CRETACEOUS QUEEN CHARLOTTE GROUP, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA

Abstract

Six lower Albian to lower Turonian megafossil zones have been recognized in the Sandstone and Shale members of the Haida Formation exposed in Cumshewa Inlet, Queen Charlotte Islands; however, no fossils have been recovered there from the overlying Honna Formation. In Skidegate Inlet, **Mytiloides labiatus** (Schlotheim) s.l. has been identified from the Skidegate Formation at its type locality, thus affirming the early Turonian age of these beds and indicating that the Skidegate is, in part, coeval with the Shale member of the Haida Formation. At a second locality, strata lithologically comparable with the Skidegate Formation have yielded **Inoceramus** sp. cf. **I. multiformis** Pergament, suggesting that the youngest Skidegate beds are, locally, early Coniacian. The presence of I. sp. cf. **I. multiformis** in basal beds of the Honna Formation in Skidegate Inlet indicates that no significant hiatus is represented between this formation and the older, Haida and Skidegate strata in this area. **Peroniceras** (s.s.) sp., of later Coniacian age, has been collected from the upper part of the basal conglomerate of the Honna Formation as well.

It is suggested that the occurrence of **Douvilleiceras** spp. in Skidegate Inlet may form a lower subzone within the late early Albian **Brewericeras hulenense** (Anderson) Zone. Likewise, the lack of **Mortoniceras** spp. in many exposures of the **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves) Zone in the Queen Charlotte Islands appears to indicate that **Mortoniceras** is restricted to the lower part of the range of **D. (P.) dawsoni**. The presence of **Peroniceras** (s.s.) sp. in Skidegate Inlet is the first direct evidence of Coniacian strata on the Pacific coast of Canada.

Résumé

Six zones de mégafossils de l'Albien inférieur au Toronien inférieur ont été identifiées dans les membres de grès et de schistes argileux de la formation de Haida apparaissant dans l'inlet Cumshewa des îles Queen Charlotte; toutefois, aucun fossil n'a été décelé à cet endroit dans la formation de recouvrement Honna. Dans l'inlet Skidegate, des **Mytiloides labiatus** (Schlotheim) s.l. ont été identifiés dans la formation de Skidegate et reconnus comme typiquement régionals, ce qui confirme que ces couches sont du Turonien inférieur et indiquent que cette formation est, en partie, du même âge que le membre des schistes argileux de la formation de Haida. Sur un second site, des couches lithologiquement comparables à la formation de Skidegate contiennent des spécimens d'**Inoceramus** sp. cf. **I. multiformis** (Pergament), ce qui suggère que les couches les plus jeunes de la formation de Skidegate sont, régionalement, du Coniacien inférieur. La présence de **I.** sp. cf. **I. multiformis** à la base des couches de la formation de Honna dans l'inlet Skidegate indique qu'il n'y a pas d'interruption entre cette formation et les couches Haida et Skidegate plus vieilles de cette région. Des **Peronicas** (s.s.) sp. du Coniacien supérieur ont été échantillonnés dans la partie supérieure des conglomérats basals de la formation de Honna bien entendu.

On a suggéré que des venues de **Douvilleiceras** spp. dans l'inlet Skidegate auraient la possibilité de former une sous-zone inférieure à l'intérieur de la zone des **Brewericeras hulenense** (Anderson) de la fin de l'Albien inférieur. De même, l'absence des **Mortoniceras** spp. dans plusieurs coupes de la zone des **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves) des îles Queen Charlotte semble indiquée que les **Mortoniceras** sont restreints à la partie inférieure de la série des **D. (P.) dawsoni**. La présence des **Peroniceras** (s.s.) sp. dans l'inlet Skidegate se trouve la preuve positive de la présence des couches coniaciennes sur le littoral canadien du Pacifique.

INTRODUCTION

Marine strata of mid-Cretaceous (Albian-Coniacian) age are presently known from three areas of coastal British Columbia. Two of these areas, Howe Sound, north of the city of Vancouver (see Jeletzky, 1977, p. 101), and northern Vancouver Island (see Jeletzky, 1976 for summary) are characterized by poorly fossiliferous, discontinuous, and tectonically disturbed sequences. In contrast, strata in the third region, the Queen Charlotte Islands, are widely distributed, generally well preserved, and consist of relatively thick sedimentary sequences. This last region has thus served as an important reference point for interpretations of the mid-Cretaceous biochronology and stratigraphy of Canada's Pacific coast. In addition, the Cretaceous stratigraphic sequence of the Queen Charlotte Islands figures prominently in current discussions of the Mesozoic tectonic history of the region.

In spite of this important position as a cornerstone for Pacific coast biochronology and stratigraphy, the mid-Cretaceous sequence of the Queen Charlotte Islands has received relatively little study. A recent investigation of the lithological and faunal successions within these strata was undertaken to improve understanding of the mid-Cretaceous biochronological framework of this Pacific coast region. Analysis of new stratigraphic sections in the Queen Charlotte Islands and the associated invertebrate megafauna has resulted in a reassessment of the stratigraphy and faunal occurrences within the region.

ACKNOWLEDGMENTS

S. Baum and I. Cameron gave valuable assistance in the field. B.E.B. Cameron provided logistical advice and discussion at base camp and originally proposed the possibility of equivalence of the Skidegate and Haida Shale member, based on his analysis of foraminiferal assemblages. J.A. Jeletzky is thanked for his expertise and continuing interest in this project. T.P. Poulton, J.A. Jeletzky and E.T. Tozer reviewed the manuscript and suggested significant improvements.

PREVIOUS WORK

A detailed account of the early geological investigations of Mesozoic strata in the Queen Charlotte Islands is given in McLearn (1949). Cretaceous strata of the archipelago were first studied by field parties of the Geological Survey of Canada (in Richardson, 1873; Dawson, 1880). Clapp (1914) proposed the term Queen Charlotte series, and defined and described three major units composing the sequence: the Haida, Honna and Skidegate members, in ascending stratigraphic order. MacKenzie (1916) subsequently raised these three units to formation status. No additional papers dealt with the group in depth until the detailed investigation of Sutherland Brown (1968) who referred to the entire succession as the Queen Charlotte Group. Yorath and Chase (1981) considered the group to be a post-suture assemblage reflecting the accretion of the exotic block of the amalgamated Alexander and Wrangellia terranes to the continental margin in mid- to late Cretaceous time. Yagishita (1985) suggested that the sediments of the Haida and Honna formations were derived from a mature volcanic arc located east of the islands.

The fossils collected by the early geologists were described and discussed in several publications (Billings, 1873; Whiteaves, 1876, 1884, 1889, 1900). Other than a monograph on the ammonites of the Sandstone member of the Haida Formation (McLearn, 1972), a short taxonomic paper describing an ammonite and inoceramids from the Haida and Honna formations (Riccardi, 1981), and discussion of some fossil collections from the islands by U.S. Geological Survey and other paleontologists (Jones et al., 1965), there has been little recent work undertaken on the megafossil paleontology or stratigraphy of the Queen Charlotte Group.

This report describes results of a study of outcrops of the Queen Charlotte Group in Cumshewa Inlet, western Skidegate Inlet and the Beresford Bay region (Fig. 1). Discussion of the stratigraphy and fossil occurrences in each of these three areas is presented separately and summarized. The regions are covered by the Cumshewa, Skidegate Channel, and Langara 1:50 000 scale map sheets (NTS 103G/4, 103F/1, and 103K/3, respectively) and the comprehensive geological maps and discussion of Sutherland Brown (1968) served as a basis for these investigations.

Because the strata in these three regions are only rarely exposed in orderly stratigraphic successions, a detailed lithofacies analysis was undertaken in each area as a preliminary basis for local correlations of the many discontinuous outcrops.

CUMSHEWA INLET REGION

Strata of the Honna and Haida formations, including both the Sandstone and the Shale members of the Haida (Sutherland Brown, 1968), outcrop extensively on the north shore of Cumshewa Inlet (Fig. 2). These outcrops were visited by early Survey geologists and several important megafossil collections were made by these parties, unfortunately with poor locality data and stratigraphic control.

In a general sense, Queen Charlotte Group strata occur in a synclinal outcrop pattern in Cumshewa Inlet. The older Albian strata outcrop on the eastern and western margins of the syncline near McLellan Island and Dawson Cove, respectively. Younger Albian, Cenomanian, and Turonian strata occur in the middle, extending from Conglomerate Point several kilometres to the west.

Outcrops along the inlet occur primarily as short exposures separated by longer, covered intervals, generally inferred to be fault zones. The Shale member of the Haida Formation appears to have been more susceptible to deformation, as folding and shearing of the sediments, igneous intrusions, and siliceous veins occur most commonly in this member. The discontinuity of outcrop and abundance of faulting make determination of unit thicknesses difficult. However, several short sections of strata were measured and these are plotted on Figure 2.

Haida Formation

Sandstone member

The basal Sandstone member of the Haida Formation unconformably overlies older Mesozoic strata in the Cumshewa Inlet region. Three distinct lithofacies predominate within the member in the inlet: a basal, pebbly sandstone lithofacies; an intermediate, thick-bedded sandstone lithofacies; and an upper, thin-bedded sandstone lithofacies. The observed succession of these facies in the studied sections reflects initial inundation by marine waters and subsequent deepening as transgression progressed. The constant relative positioning of these three lithofacies in the section allows them to be used as informal stratigraphic units (Fig. 3).

The basal lithofacies of the Sandstone member outcrops at various localities on the inlet, but particularly well exposed sequences can be seen on the north shore of the inlet

east of McLellan Island (Fig. 4a), and on the southwestern side of the triangular peninsula west of Conglomerate Point (Fig. 4b). The contact of the Haida with underlying strata was observed only at the second site, where Cretaceous sandstone overlies steeply dipping argillite and sandstone of the Triassic-Jurassic Kunga(?) Formation. This second locality is the one described and illustrated by Dawson (1880, p. 81; Fig. 7, 8). At both localities, the Cretaceous strata consist of orange-buff to grey-green, medium- to coarse-grained sandstone, apparently massive in places but most commonly showing low- to high-angle planar and trough cross-stratification. The sandstone beds range from 0.5 to 2.0 m in thickness and generally show wavy upper surfaces. Locally, 2 to 3 cm thick siltstone and mudstone interbeds occur in the sandstone. These interbeds are commonly burrowed, but some show original depositional laminae rich in carbonaceous material. Thin, conglomeratic horizons with pebbles and small cobbles occur at various intervals (Fig. 4c), and similar-sized clasts are occasionally noted singly in the matrix. Oysters, rare ammonites and abundant trigoniid bivalves, as well as minor amounts of wood and other molluscs are the only fossils noted in these basal beds (Fig. 4d). Horizontal burrows are commonly observed in the more massive sandstone beds. A 24 m thick succession of these basal beds, with faulted lower and upper contacts, was measured on the peninsula west of Conglomerate Point (section D). The facies is indicative of a shallow water, marine depositional environment.

Strata of the second lithofacies, a thick-bedded sandstone facies, were studied on the north shore of Cumshewa Inlet east of McLellan Island (Fig. 5a), at the eastern end of the triangular peninsula west of Conglomerate Point, and as well on the north shore of Dawson Cove. A particularly well exposed section is found at this last locality,

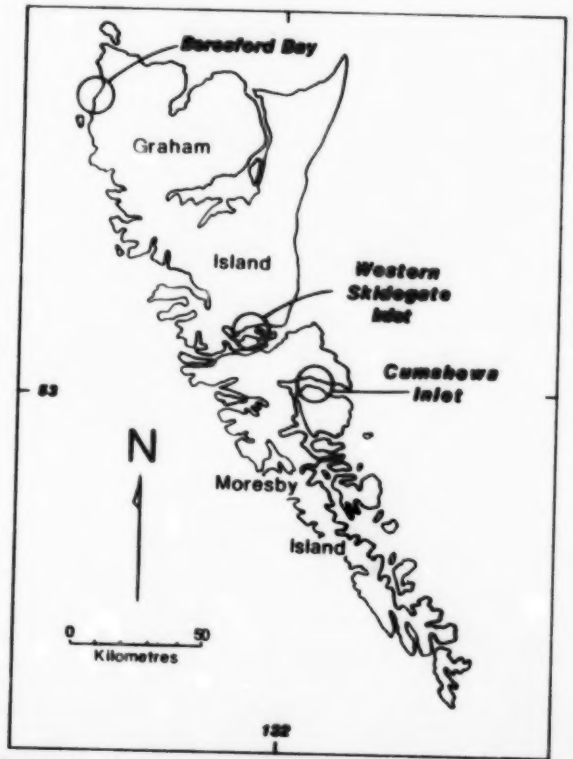


Figure 1. Regional map of the Queen Charlotte Islands archipelago showing the principal areas visited during this study.

showing interfingering with the upper lithofacies of the Sandstone member. Interfingering of the pebbly sandstone lithofacies with the thick-bedded sandstone lithofacies was not observed. However, a gradational contact between the two is assumed, based on the apparent stratigraphic positions of isolated outcrops of both facies, as well as the deeper-water aspect of the latter.

The thick-bedded sandstone lithofacies typically consists of fine- to medium-grained greenish black to tan sandstone. The sandstone beds are laterally persistent, and are massive or exhibit low-angle planar cross-stratification; amalgamations of these beds may be many metres in thickness, but thin (1-3 cm) interbeds of siltstone occur within the sands at some localities. Pebbles do not occur in this facies. The sandstone contains numerous thick burrows that are commonly oxidized orange or dark brown and impart a mottled appearance to the outcrop. Dark brown to black concretions are common, some as large as one third of a metre in diameter, and numerous fossils were collected from these. Silicified and coalified wood fragments, some several centimetres in diameter and commonly showing **Teredolites** borings, are abundant, as are infaunal bivalves, gastropods and ammonites, many oriented vertically (Fig. 5b).

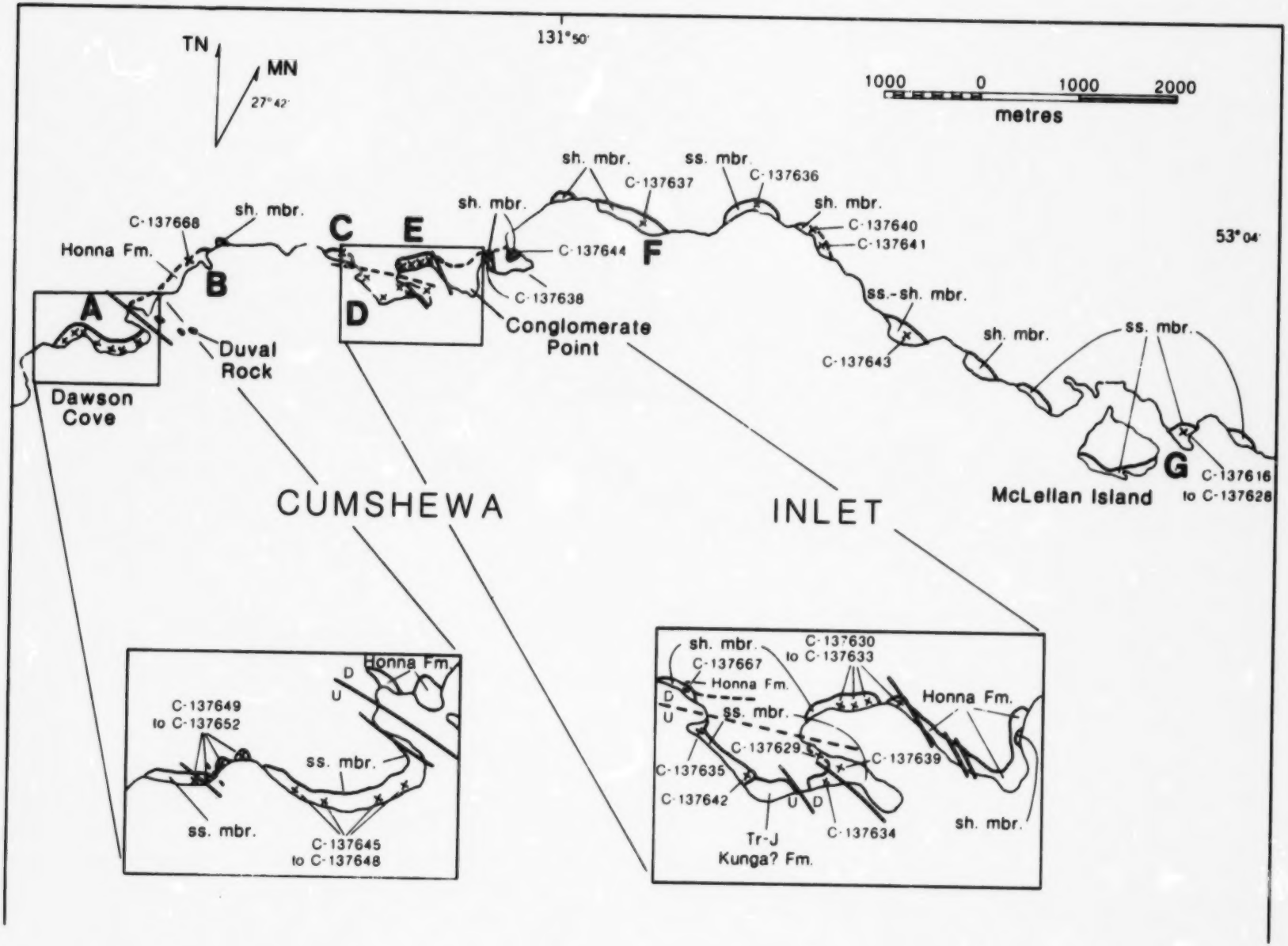
A 107 m thick section of this facies was measured east of McLellan Island (section G), whereas on the north shore of Dawson Cove, approximately 115 m of strata of this facies outcrop (section A).

The highest part of the Dawson Cove section shows interfingering of the thick-bedded sandstone lithofacies with the overlying thin-bedded sandstone lithofacies. The latter facies consists of greenish-grey to black-green, fine grained, silty sandstone interbedded with shale and siltstone. The facies outcrops at various localities on the north shore of the inlet west of McLellan Island and is particularly well exposed in the upper part of the Dawson Cove section. The sandstone beds are generally quite similar to those of the underlying thick-bedded sandstone facies in their internal stratification and degree of bioturbation, but the occurrences of wood and invertebrates are not as common. In contrast to the thick-bedded sandstone facies, however, siltstone and shale interbeds occur commonly within this facies. Some of the sandstone of this lithofacies in the Dawson Cove section is locally bright blue-green. The shale is dark grey to black and commonly concretionary, containing numerous infaunal, divaricate bivalves dispersed through the matrix, and some slightly pyritized ammonites in the concretions. Due to the tendency for the shale sections to act as slip planes for fault activity, an accurate thickness of this facies is difficult to obtain. In the Dawson Cove section, up to 65 m of the facies may be represented in discontinous exposures separated by covered intervals.

Shale member

The Shale member of the Haida Formation occurs at various localities on the north shore of Cumshewa Inlet, occupying the east-central portion of the synclinal flexure of Queen Charlotte Group strata. Easternmost outcrops of the member occur approximately 5.25 km east of Conglomerate Point, and are found discontinuously along the beach for about 2.6 km west of the point.

Strata underlying the Shale member at several localities consist of interbedded sandstone and shale, reflecting the gradational transition from the Sandstone member to the Shale member. These transitional beds can best be seen on the north shore west of McLellan Island near the eastern limit of Shale member outcrops, as well as in the upper part of the section exposed on the north shore of Dawson Cove. For this discussion, I refer the interbedded sandstone and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McLellan Island
Duval Rock
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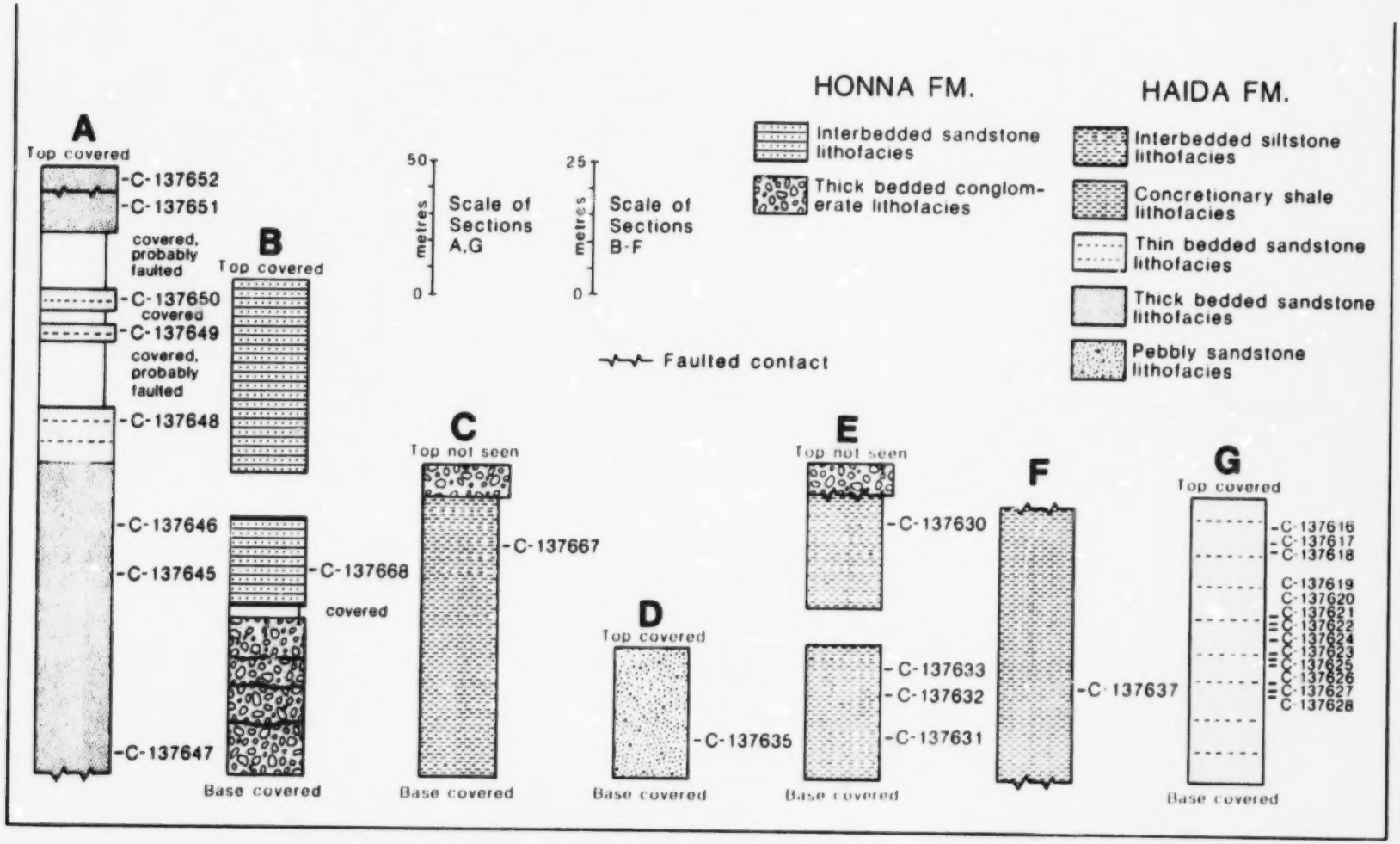


Figure 2. Detailed outcrop map of the north shore of Cumshewa Inlet showing the distribution of Cretaceous strata, GSC fossil localities, and location of measured sections. No correlation of sections is implied.

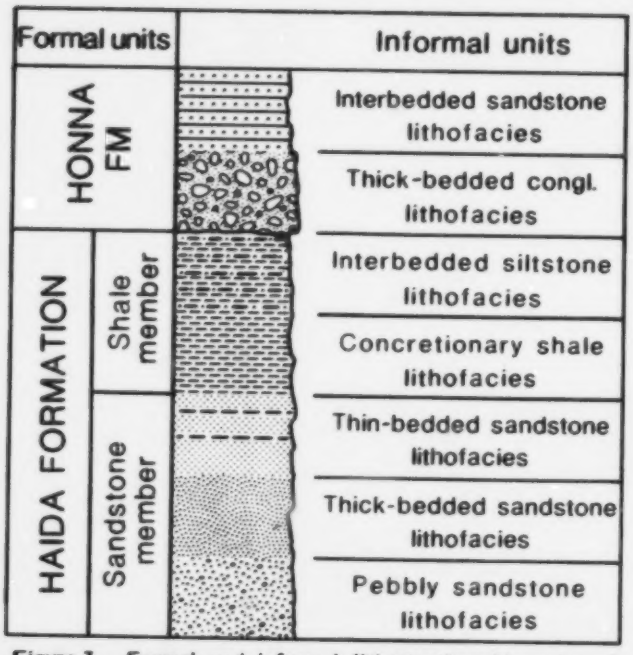


Figure 3. Formal and informal lithostratigraphic units of the Haida and Honna formations in Cumshewa Inlet region.

shale to the Sandstone member (see above). The upper boundary of the Shale member is its abrupt contact with the overlying Honna Formation conglomerate.

Two distinct lithofacies predominate within the Shale member in Cumshewa Inlet (Fig. 3). The first of these, a concretionary shale lithofacies, consists of thick accumulations of grey to black, silty shale with interbedded concretionary limestone horizons, and a few fine- to medium-grained sandstone beds up to 30 cm in thickness. This facies is best exposed on the tidal bench 1-2 km northeast of Conglomerate Point (Fig. 6a). Faulting and igneous intrusions have altered the shale here, creating a very brittle texture and obscuring most sedimentary structures and fossils. The calcareous, concretionary horizons can be up to 50 cm thick and appear to be very early diagenetic features; sand laminae are commonly observed to pass through the concretions and are generally not deformed by postdepositional compaction. Some of the concretionary horizons appear to have formed along specific bedding planes by the coalescing of individual centres of concretion development.

Although substantial sediment heating from local intrusive activity has altered most megafossils beyond recognition, occasional discoveries of a diverse fauna of poorly preserved ammonites, gastropods, and bivalves suggest that molluscs were common inhabitants of the sedimentary environment in which these strata accumulated (Fig. 6b). Articulated valves of inoceramids, some reaching 60 cm in length, are commonly noted in life position within the strata (Fig. 6c).

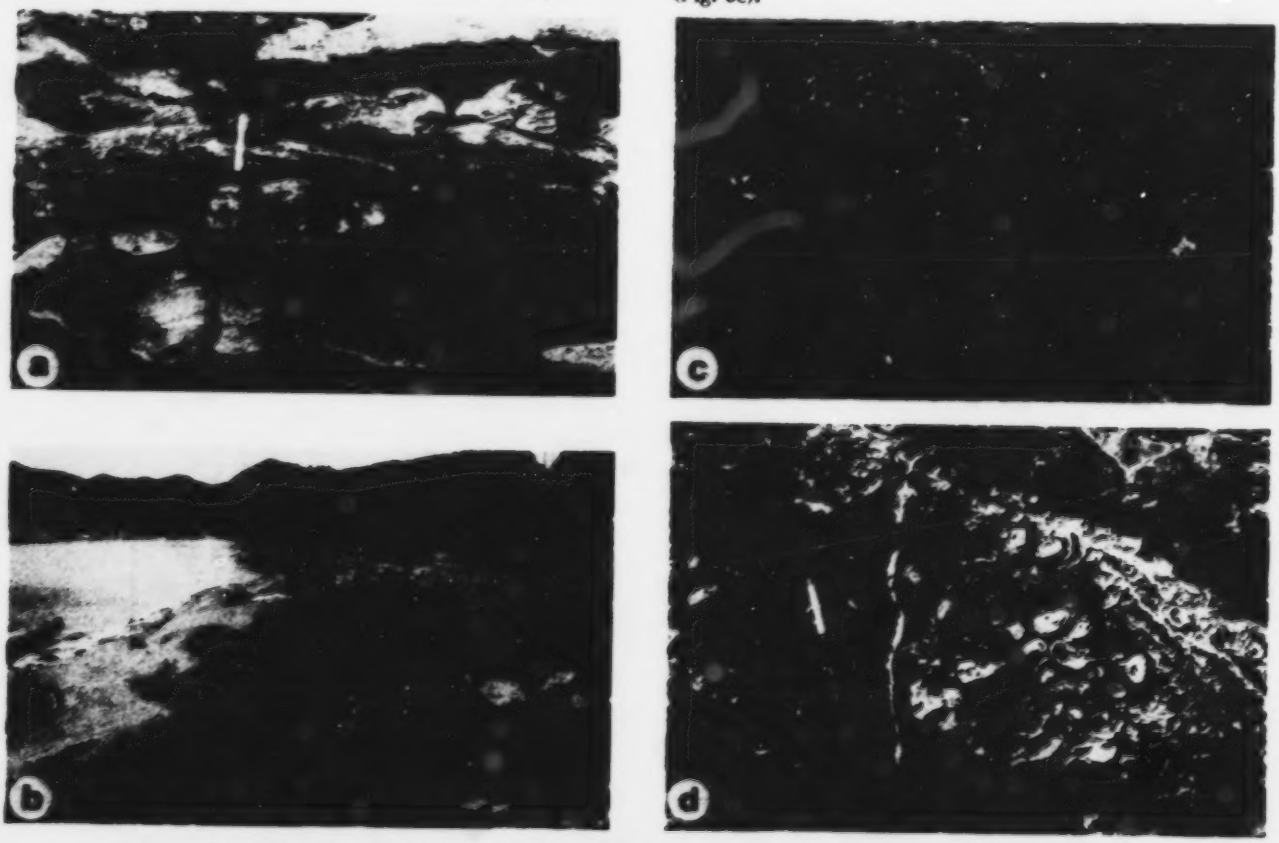


Figure 4. The pebbly sandstone facies of the Sandstone member of the Haida Formation, Cumshewa Inlet. a) Interbedded high-angle cross-stratified, coarse grained sandstones and thin mudstones outcropping east of McLellan Island (GSC photo 204324-G). b) Plane-bedded, medium- to coarse-grained sandstones onlapping steeply-dipping strata of the Triassic-Jurassic Kunga(?) Formation, section D (compare with Dawson, 1880, Figs. 7, 8; GSC photo 204324-I). c) Coarse grained pebbly sandstones occurring at locality b) (GSC photo 204324-H). d) Lag deposit of oysters, trigoniids, other bivalves, and gastropods in basal sandstone lithofacies, GSC locality C-137642 (GSC photo 204324-Z).

The second recognizable lithofacies within the Shale member in Cumshewa Inlet is an interbedded siltstone lithofacies, containing numerous horizons of shale with interbedded siltstone and fine grained sandstone (Fig. 7a). This unit apparently corresponds to the "uppermost thinly developed sandstone submember" of Yagishita (1985, p. 672). At Conglomerate Point and the point to the east, this facies occurs in the intertidal zone as small outcrops underlying the Honna Formation. Other exposures occur on the beach for 1.75 km to the west of the triangular peninsula west of Conglomerate Point.

Sediments of this lithofacies are typically grey or dark grey but grade to greenish grey. The silt and sand beds may reach 15 cm in thickness (Fig. 7b) and the proportion of siltstone and sandstone is approximately equal to that of the shale fraction. Vertical burrows disrupt depositional laminae in a few outcrops and ripple laminae are also present locally. Pyrite accumulations are more common in the shales of this facies, especially near local intrusions. Concretion development is not as extensive as in the purer shale facies, but a few beds reach 25 cm in thickness and extend laterally for tens of metres. Fossil molluscs, found only in the concretionary horizons, are less common but better preserved in this facies.

A total thickness of the Shale member within Cumshewa Inlet was not determined due to the isolated nature of outcrops. A 51 m thick section of the concretionary shale lithofacies was measured on the beach 1.75 km east of Conglomerate Point (section F), and a composite section of 46 m was constructed from the interbedded siltstone lithofacies in the small bay just west of Conglomerate Point (section E). A 52 m thick section of this second lithofacies was measured 500 m northwest of the triangular peninsula west of Conglomerate Point (section C).

Based on biostratigraphic evidence, the interbedded siltstone lithofacies of the Shale member is younger than the concretionary shale lithofacies. As all outcrops of the interbedded siltstone lithofacies are either in contact with the overlying Honna Formation or are located adjacent to outcrops of that unit, it is possible that the upsection increase in coarse clastics within this member prefaces the introduction of conglomerate and sandstone of the Honna Formation into the basin.

Honna Formation

The Honna Formation outcrops extensively on the north shore of Cumshewa Inlet between Duval Rock, east of Dawson Cove, and Conglomerate Point. The unit typically forms massive bluffs and is, in general, readily distinguished from the Sandstone member of the Haida Formation by its lighter colour and lack of fossils.

The lowest portion of the Honna is a thick-bedded conglomerate lithofacies characterized by massive cobble/boulder conglomerate with lenses of medium to coarse sandstone (Fig. 8a). The sand lenses commonly appear structureless but sometimes show planar cross-stratification. The margins of these sand bodies have either gradational or abrupt boundaries with the conglomerate. Locally, the conglomerate shows faint imbrication, but in general it is chaotic and clast supported. Although silicified logs are sometimes noted in the Honna conglomerate, no molluscs were observed. Details of the composition of the conglomerate are given by Sutherland Brown (1968).

The Honna rests with probable disconformity on the underlying Shale member of the Haida Formation in Cumshewa Inlet. At all sites where the contact can be observed, the interbedded siltstone lithofacies of the Shale member is represented and its contact with the overlying Honna conglomerate is generally abrupt (Fig. 8b). The actual contact can be observed on the tidal bench on the east and west sides of Conglomerate Point, at the upper tidal limit along the beach 1.3 km west of Conglomerate Point (section C), and on the north side of the point just east of Conglomerate Point. Sutherland Brown (1968, Fig. 5, sheet B) assigned the underlying strata at this last site to the Jurassic Maude Formation, but this assignment is most likely a colour misprint on that map – the point is formed by a thick sequence of Honna conglomerate overlying fossiliferous beds of the Shale member of the Haida, which have similar attitudes on both the north and south sides of the point.

The best exposure of the lower boundary of the Honna, and the most easily accessible, is at the locality 1.3 km west of Conglomerate Point (section C). At this locality, the Honna is in sharp depositional contact with a 52 m thick section of the upper beds of the Shale member of the Haida. A few cobbles occur in the siltstone and shale matrix of the uppermost Haida beds, but the transition is abrupt. Sand lenses within the conglomerate indicate that bedding in this unit is subparallel to that of the underlying silt and shale.

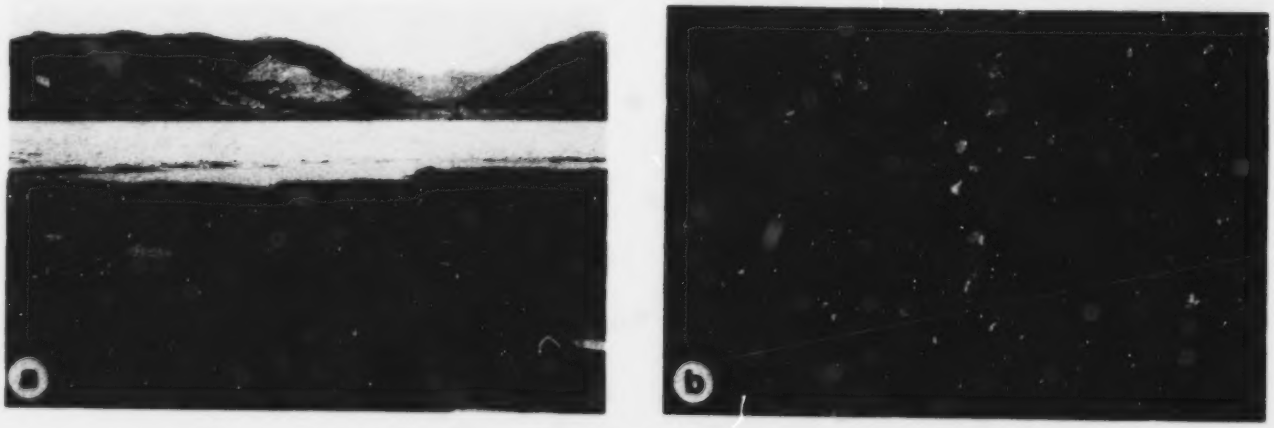


Figure 5. The thick-bedded sandstone lithofacies of the Sandstone member of the Haida Formation, Cumshewa Inlet. a) Outcrop at tidal bench east of McLellan Island, section G (GSC photo 204384-G). b) Vertically embedded ammonite in fine grained sandstone at GSC locality C-137636 (GSC photo 204324-V).

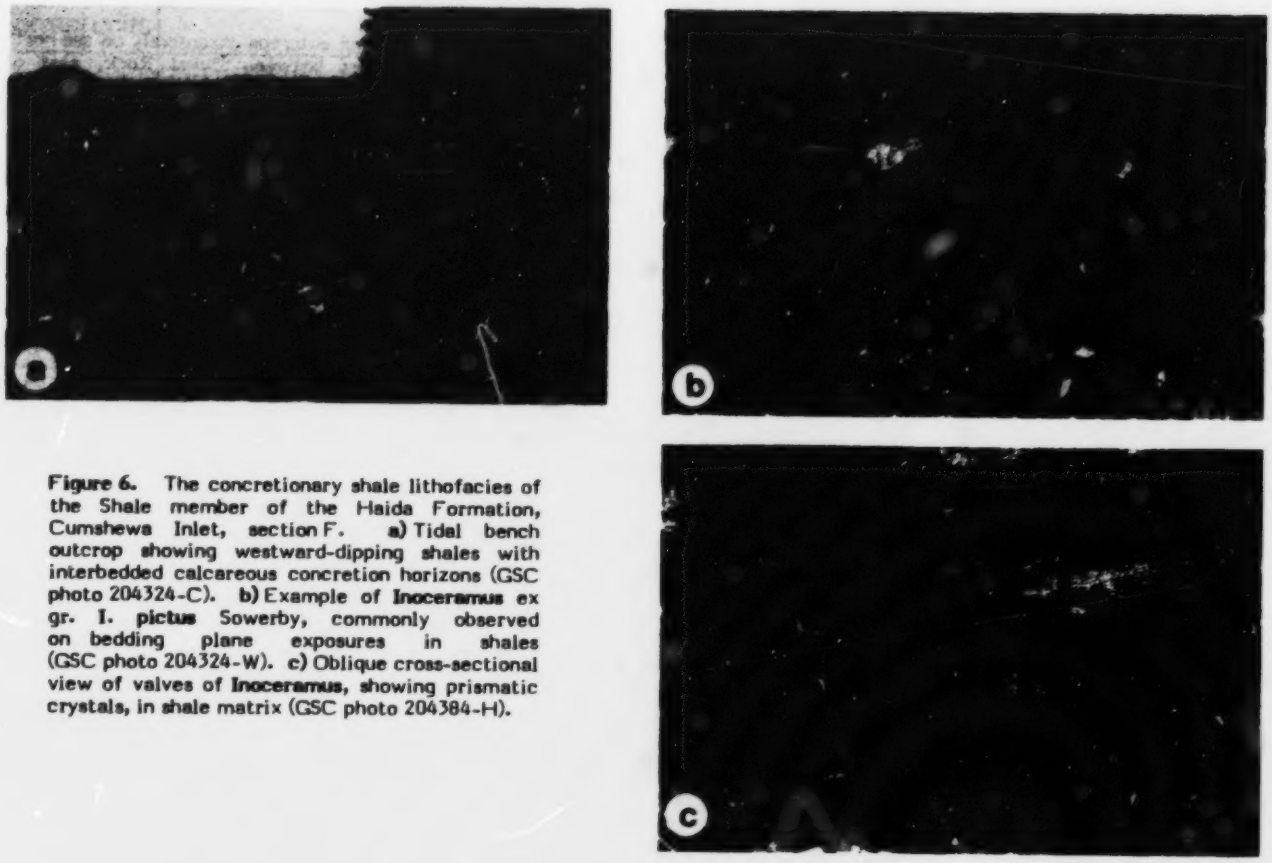


Figure 6. The concretionary shale lithofacies of the Shale member of the Haida Formation, Cumshewa Inlet, section F. a) Tidal bench outcrop showing westward-dipping shales with interbedded calcareous concretion horizons (GSC photo 204324-C). b) Example of **Inoceramus** ex gr. **I. pictus** Sowerby, commonly observed on bedding plane exposures in shales (GSC photo 204324-W). c) Oblique cross-sectional view of valves of **Inoceramus**, showing prismatic crystals, in shale matrix (GSC photo 204384-H).

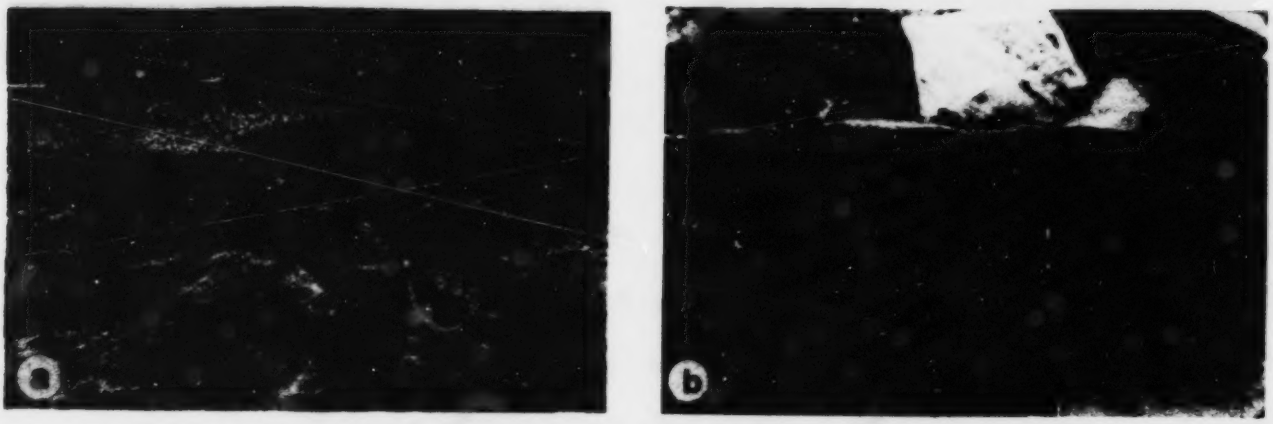


Figure 7. Interbedded siltstone lithofacies of the Shale member of the Haida Formation, Cumshewa Inlet, section E. a) Shales with interbedded siltstone and fine grained sandstone, fieldbook for scale (GSC photo 204324-A). b) Sandstone interbed showing sediment grading, plane laminations and ripple laminations in upper part of bed (GSC photo 204384-J).

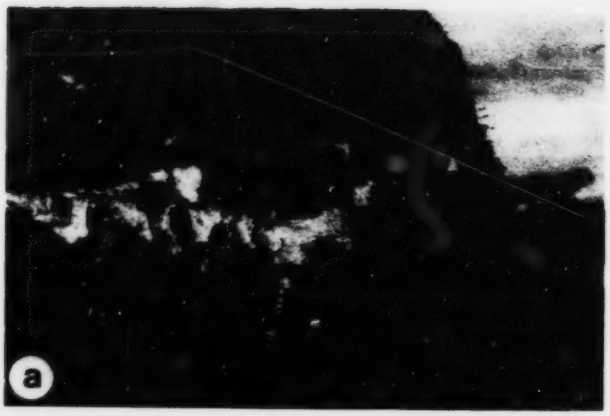


Figure 8. Thick-bedded conglomerate lithofacies of the Honna Formation, Cumshewa Inlet. **a)** Medium grained sandstone lens within massive cobble conglomerate, point east of Conglomerate Point (GSC photo 204324-J). **b)** Contact of the lower Honna with the Shale member of the Haida (interbedded siltstone lithofacies), section C (GSC photo 204324-K).

The conglomerate varies in thickness. On the east side of Conglomerate Point, at least 15 m outcrop in the bluff. Even thicker sequences of conglomerate form the chain of small islands west of Duval Rock and outcrop along the shore for several hundred metres to the north.

Yorath and Chase (1981) and Yagishita (1985) suggested that the Honna conglomerate is derived primarily from easterly sources on the mainland of British Columbia. Thus, the conglomerate appears to reflect progradation of easterly-derived sediment into more westerly, deeper marine portions of the basin.

The Honna conglomerate grades upward into an interbedded sandstone lithofacies, the lower part of which can be seen high in the bluff on the east side of Conglomerate Point. The upper beds of this facies are best displayed in a section preserved on the small peninsula 650 m north of Duval Rock (section B, upper part). The base of this section is separated from the basal conglomerate by a covered interval, presumably a fault. The lower part of the exposed section includes thick, medium- to coarse-grained sandstone beds ranging from 0.75 to 1.8 m in thickness. Small, rounded pebbles occur at several horizons, as do thin (2-6 cm), bioturbated shale beds. In the upper part of this section, the shale beds become thicker and more common and the sandstone beds become correspondingly thinner. The top of the section is covered.

At a small exposure on the beach to the southwest of this locality (section B, lower part), approximately 45 m of strata in the lower part of the Honna show repeated fining-upward cycles of conglomerate grading into beds of coarse sand with minor amounts of small pebbles. A 2 m thick covered interval separates the conglomeratic beds from 25 m of fine- to medium-grained sandstone and shale (Fig. 9a) with nearly identical attitude. Many of these sandstone beds appear to be of turbidite origin. They range from 1 to 2 cm to more than 30 cm in thickness, show basal load casts and Bouma abc sequences (Fig. 9b, c), and increase in thickness upsection. The shale interbeds are quite thin.

Sutherland Brown (1968) suggested a thickness for the Honna in Cumshewa Inlet of approximately 450 m. I feel that this estimate is most likely somewhat high. Although a continuous section of the formation is nowhere preserved, it is suggested that many sections of the Honna in Cumshewa Inlet are repeated by faulting. A more likely approximation is 200 m.

Biostratigraphy

Strata of the Haida Formation in Cumshewa Inlet are locally quite fossiliferous. Unfortunately, no megafossils were found in the Honna Formation in Cumshewa Inlet. Table 1 summarizes the occurrences of identified taxa of ammonites and inoceramids.

The preceding discussion of the lithostratigraphy of the Haida Sandstone member focused on the lithofacies characteristic of this unit in Cumshewa Inlet. The succession of these lithofacies observed in the various sections of the Sandstone member, and indeed, the succeeding lower Shale member, appears to be constant and predictable, the entire sequence probably resultant from deposition in a regime of

rising sea level. Isolated outcrops of the formation can thus be approximately located within a composite stratigraphic sequence relative to other such outcrops, based on their respective lithologies. This was done for the various individual fossiliferous outcrops visited in the central part of the Sandstone member outcrop belt in Cumshewa Inlet. The associated fossil assemblages at these localities were then compared with the assemblages occurring in the western and eastern sections of the member at Dawson Cove and near McLellan Island, respectively. These assemblages are summarized in Table 2.

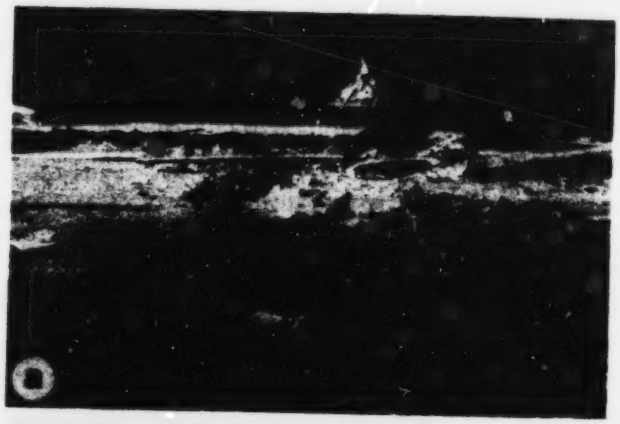
A sequence of six megafossil faunas and zones can be recognized within the strata, with ages spanning the early Albian to early Turonian. Several of these zones were previously established by McLearn (1972) in the eastern Skidegate Inlet region.

Brewericeras hulenense Zone. Strata of the Sandstone member of the Haida Formation occurring in Dawson Cove are assigned to this zone on the basis of the zonal index, **Brewericeras hulenense** (Anderson) (Plate 1, fig. 1). The species was collected from several horizons in the section and Sutherland Brown (1968, Table 9) reported **Brewericeras hulenense** from Dawson Cove as well (GSC locality 44670).

Brewericeras hulenense is assigned to the late early Albian in the North Pacific region by most workers. Jones (in Sutherland Brown, 1968) established the presence of the zone in Skidegate Inlet and the species is considered diagnostic of upper lower Albian deposits in the northeastern USSR (Pergament, 1977), southern Alaska (Imlay, 1960; Jones, 1967), elsewhere in British Columbia (Jeletzky and Tipper, 1968; Jeletzky, 1977), and in California and Oregon (Jones et al., 1965). Associated with **B. hulenense** in the Dawson Cove section are **Parasilesites** cf. **P. laperousianus** (Whiteaves), **Inoceramus** cf. **I. (Birostrina) concentrica** Parkinson, and **Inoceramus (Actinoceramus) salomoni** D'Orbigny. McLearn (1972) considered the first of these as characteristic of the **B. hulenense** Zone in eastern Skidegate Inlet and other species of **Parasilesites** appear to be restricted to the **B. hulenense** Zone in northeastern USSR (Pergament, 1977) and Alaska (Imlay, 1959, 1960; Jones et al., 1965). Jones (1960) reported **I. (A.) salomoni** from upper lower to middle Albian strata of southwestern Oregon, but the species is reported to range into the lower upper Albian in the Kamchatka region (Pergament, 1977).

Also occurring in the Dawson Cove section are two fossils referred to **Beudanticeras**? and **Cleoniceras** s.s. The umbilically nodose specimen of **Cleoniceras** s.s. is distinguished from **Cleoniceras (Grycia) perezianum** (Whiteaves) which characterizes the zone successive to the **B. hulenense** Zone in eastern Skidegate Inlet (McLearn, 1972).

Cleoniceras (Grycia) perezianum Fauna. Jones (in Sutherland Brown, 1968) established the **Cleoniceras (Grycia) perezianum** Zone in eastern Skidegate Inlet for strata overlying the **Brewericeras hulenense** Zone which contain the zonal index **C. (G.) perezianum** (Whiteaves). Although this species was not collected from Cumshewa Inlet, beds from the middle part of the Sandstone member outcropping in the eastern section near McLellan Island (section G) and in the central outcrop region to the west of the island, are provisionally referred to the **C. (G.) perezianum** fauna. Included in the fauna are GSC localities C-137629, C-137634, C-137636, and C-137639. These beds are referred to the



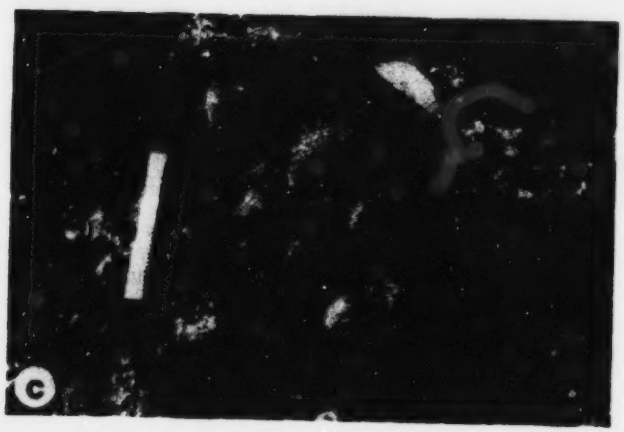


Figure 9. a) The upper, interbedded sandstone lithofacies of the Honna Formation, Cumshewa Inlet, section B (lower part), vest at left for scale (GSC photo 204324-D). b) Sandstone bed showing Bouma abc sequence (GSC photo 204384-A). c) Load casts on base of sandstone bed (GSC photo 204384-C).

C. (G.) perezianum fauna on the following grounds: 1) The beds lack the typical forms of the older, **Brewericeras hulenense** Zone. 2) The beds are apparently stratigraphically below beds containing the younger, upper Albian fauna of the **Desmoceras (Pseudouhligella) dawsoni** Zone, and 3) the beds contain certain species which are not present in either the **B. hulenense** beds or the **D. (P.) dawsoni** beds. These species include **Desmoceras (Pseudouhligella)** cf. **D. (P.) alamoense** (Anderson), **Tetragonites rectangularis alaskaensis** Murphy, **Zelandites** cf. **Z. inflatus** Matsumoto, and **Inoceramus moresbyensis** Whiteaves (equals group of **I. anglicus** Woods). **D. (P.) alamoense** appears to be typical of the **B. hulenense** and **C. (G.) perezianum** zones in Skidegate Inlet (Jeletzky, in McLearn, 1972) while **I. anglicus** occurs commonly in the middle and lower upper Albian of the northeastern USSR (Pergament, 1977) and northern Alaska (Imlay, 1961). Thus, a general middle Albian age is suggested for this fauna in Cumshewa Inlet.

Desmoceras (Pseudouhligella) dawsoni Zone. Jones (in Sutherland Brown, 1968) recognized a zone defined by the co-occurrence of **Mortoniceras** and **Desmoceras (Pseudouhligella) dawsoni** in the Haida rocks of Skidegate Inlet. The **Mortoniceras – Desmoceras (Pseudouhligella) dawsoni** Zone in British Columbia is considered to be of latest Albian age (McLearn, 1972; Jeletzky, 1977). A few examples of **D. (P.) dawsoni** were collected along Cumshewa Inlet from localities within the upper part of the Sandstone member (interbedded siltstone facies) and lower Shale member (GSC loc. C-137640 and C-137641). Associated with **D. (P.) dawsoni** at these localities are **D. (P.) subezoanum** McLearn, **Pseudhelicoceras carlottense** (Whiteaves), **Marshallites cumshewaensis** (Whiteaves), **Hypophylloceras** aff. **H. californicum** (Anderson), and **Anagaudryceras sacya** (Forbes). No examples of **Mortoniceras** were collected from strata along Cumshewa Inlet.

Desmoceras (Pseudouhligella) japonicum Zone. In lower beds of the Shale member of the Haida Formation (concretionary shale facies), examples of **D. (P.) japonicum** (Yabe) have been collected at GSC locality C-137637 (section F) (Plate 1, fig. 7). A diverse but sparse and poorly preserved fauna of other molluscs also occurs at this locality, including **Calycoceras** cf. **C. asiaticum** Matsumoto, Saito and Fukuda, **Calycoceras** cf. **C. orientale** Matsumoto, Saito and Fukuda, **Sciponoceras** cf. **S. gracile** (Shumard), **Hypoturrilites** cf. **H. tuberculatus** (Bosc), **Inoceramus** ex gr. **I. pictus** Sowerby, **Tetragonites** sp., and **Inoceramus** cf. **I. ginterensis** Pergament (Plate 1, fig. 4). Several of these taxa have not previously been reported from British Columbia. However, the zonal ammonite was previously found in eastern Skidegate Inlet (Sutherland Brown, 1968; McLearn, 1972) and the fauna is widespread on the Pacific slope of North America (Jeletzky, 1977, p. 116).

Table 1. Fossil occurrences in Cumshewa Inlet

	Haida Sandstone mbr (Section A)						Haida SS mbr (Central outcrops)					Haida Sandstone member (Section G)									Haida Shale mbr						
	C-137647	C-137646	C-137645	C-137648	C-137649	C-137650	C-137651	C-137652	C-137635	C-137639	C-137629	C-137636	C-137634	C-137643	C-137628	C-137627	C-137626	C-137625	C-137624	C-137623	C-137622	C-137621	C-137620	C-137619	C-137618	C-137617	C-137616	C-137640	C-137641	C-137637	C-137633	C-137632	C-137631	C-137630	C-137638
Mytiloides labiatus (Schlotheim) s.l.																																			
Inoceramus aff. I. incelebratus Pergament																																			×
I. ex gr. I. pictus Sowerby																															×	×	×	×	
I. cf. I. ginterensis Pergament																														×					
Calycoceras cf. C. asiaticum Mats., Saito, & Fukuda																														×					
C. cf. C. orientale Matsumoto, Saito, & Fukuda																														×					
Desmoceras (Pseudouhligella) japonicum (Yabe)																														×					
D. (P.) sp. nov.? McLearn																														×					
Hypoturrilites cf. H. tuberculatus (Bosc)																														×					
Sciponoceras cf. S. gracile (Shumard)																														×					
Desmoceras (Pseudouhligella) dawsoni (Whiteaves)																														×					
D. (P.) subezoanum McLearn																												×	×						
Myloceras ? sp.																												×	×						
Pseudhelicoceras carlottense (Whiteaves)																													×						
Pseudhelicoceras sp.			×																									×							
Hypophylloceras aff. H. californicum (Anderson)																												×	×						
Marshallites cumshewaensis (Whiteaves)																												×							
Puzosia sp. aff. P. dilleri (Anderson)																																			
Anagaudryceras sacya (Forbes)		×	×	×	×						×	×		×	×	×		×	×	×				×					×						
Anagaudryceras sp.						×																	×						×						
Inoceramus moresbyensis Whiteaves											×				×	×						×		×											
D. (Pseudouhligella) cf. D. (P.) alamoense (Anderson)												×					×						×	×		×									
D. (Pseudouhligella) sp.													×				×							×											
Zelandites cf. Z. inflatus Matsumoto																						×													
Ammonoceratites ? sp.													×											×											
Inoceramus (Birostrina) concentrica Parkinson	×	×																																	
I. cf. I. (Birostrina) concentrica Parkinson			×	×						×																									
Tetragonites rectangularis alaskaensis Murphy										×	×						×					×													
Marshallites columbianus McLearn									×																										
Pictetia sp.							×																												
Brewericeras hulenense (Anderson)				×	×	×	×																												
Cleoniceras sp.					×																														
Parasilesites cf. P. laperousianus (Whiteaves)					×																														
Beudanticeras ? sp.		×	×																																
Inoceramus (Actinoceramus) salomoni D'Orbigny	×																																		
Zelandites cf. Z. perezi McLearn	×																																		

1A
1B
8
2A
2B
9
5
3
4
6
7

PLATE 1

All figures at natural size. Specimens were whitened with ammonium chloride prior to being photographed. All material is reposited at the Geological Survey of Canada type collection in Ottawa.

Figure 1A-B. **Brewericeras hulenense** (Anderson, 1938). GSC No. 84909 from locality GSC C-137649, Cumshewa Inlet, Dawson Cove, 164 m above base of section of the Sandstone member of the Haida Formation, upper? part of the **Brewericeras hulenense** Zone.
1A) Lateral view of best-preserved fragment (GSC photo 204291-T). 1B) Dorsal view showing vertical umbilical wall (GSC photo 204291-U).

Figure 2A-B. **Inoceramus** cf. **I. nipponicus** Nagao & Matsumoto, 1939. GSC No. 84910 from locality GSC C-137655, Skidegate Inlet, western Lina Island, 43 m above the base of the section of the Shale member of the Haida Formation, lower Cenomanian.
2A) View of left valve from above (GSC photo 204290-G). 2B) Anterior view of left valve (GSC photo 204290-W).

Figure 3. **Inoceramus** aff. **I. incelebratus** Pergament, 1966. GSC No. 84911 from locality GSC C-137632, Cumshewa Inlet, near Conglomerate Point, section E, 13 m above the base of the section of the Shale member of the Haida Formation, upper Cenomanian. View of both valves from above (GSC photo 204290-L).

Figure 4. **Inoceramus** cf. **I. ginterensis** Pergament, 1966. GSC No. 84912 from locality GSC C-137637, Cumshewa Inlet, section F, 18 m above the base of the section of the Shale member of the Haida Formation, Cenomanian, probably early late Cenomanian. Lateral view of left valve (GSC photo 204290-I).

Figure 5. **Mytiloides labiatus** (Schlotheim, 1813) s.l. GSC No. 84913 from locality GSC 44715, Skidegate Inlet, Skidegate Formation type section, lower Turonian. Latex cast of left valve (GSC photo 204289-B).

Figure 6. **Inoceramus** sp. cf. **I. multiformis** Pergament, 1971. GSC No. 84914 from locality GSC C-137653, Skidegate Inlet, western Lina Island, Skidegate? Formation outcrop in section A, uppermost Turonian to lower Coniacian. Right valve (GSC photo 204290-K).

Figure 7. **Desmoceras (Pseudouhligella) japonicum** (Yabe, 1904). GSC No. 84915 from locality GSC C-137637, same locality as figure 4. Left lateral view of fragment (GSC photo 204147-V).

Figure 8. **Peroniceras** (s.s.) sp. GSC No. 84916 from locality GSC C-137659, Skidegate Inlet, upper part of the type section of the Honna Formation, upper Coniacian. Left lateral view (GSC photo 204289-J).

Figure 9. **Stomohamites**? sp. GSC No. 84917 from locality GSC C-137665, Meyer Island, Skidegate Inlet, Skidegate Formation (GSC photo 204290-E).

The association of **D. (P.) japonicum, Calycoceras** spp., **Hypoturrilites** sp. and **Sciponoceras** cf. **S. gracile** suggests a late early Cenomanian age for the lower Shale member at this locality.

Inoceramus aff. **I. incelebratus** Fauna. Beds in the middle(?) and upper part of the Shale member of the Haida Formation that outcrop in the small bay just west of Conglomerate Point (section E) contain a few poorly preserved examples of **Inoceramus** aff. **I. incelebratus** Pergament (Plate 1, fig. 3), in association with fragments of puzosiid ammonites (GSC loc. C-137631 to C-137633). These beds are considered younger than the **D. (P.) japonicum** beds, based on the occurrence of late Cenomanian I. aff. **I. incelebratus** (Pergament, 1966; Jeletzky, 1977), as well as their apparent relative stratigraphic position. As discussed by Jeletzky (1977, p. 118), this fauna has also been recognized on northern Vancouver Island.

Mytiloides labiatus Zone. The youngest biozone yet recognized within the Cumshewa Inlet region is that of **Mytiloides labiatus** (Schlotheim) s.l. Specimens of this inoceramid were previously described by Riccardi (1981). The collection upon which Riccardi based his determination came from GSC locality 44672, collected by Sutherland Brown (1968) and described by him as coming from the basal beds of the Honna Formation at Conglomerate Point, Cumshewa Inlet. Several visits to Conglomerate Point failed to produce any molluscs at all from the Honna Formation, and an examination of the matrix of the specimen figured by Riccardi (GSC 67012) indicated that the fossil was more likely collected from the Shale member of the Haida Formation. In support of this interpretation I collected numerous examples of **M. labiatus**, which match Riccardi's specimen in matrix composition and style of preservation, from the uppermost part of the Shale member (interbedded siltstone facies) in the small bay just east of Conglomerate Point (GSC loc. C-137638). Thus, no megafossils are known with certainty from the Honna Formation in Cumshewa Inlet, and the base of that formation probably postdates the occurrence of **M. labiatus**, indicating that in this region the Honna is middle Turonian at the oldest. A significantly younger age, early Coniacian, is suggested for the lower Honna in western Skidegate Inlet (see below).

WESTERN SKIDEGATE INLET REGION

The megafossil paleontology of the Sandstone member of the Haida Formation in the eastern part of Skidegate Inlet has been studied in great detail (McLearn, 1972). Thus, priority for fieldwork was placed on the less studied successions occurring in the western part of the inlet. Outcrops of the Shale member of the Haida Formation, and the Honna and Skidegate formations were visited (Fig. 10).

According to the mapping of Sutherland Brown (1968) and the reports of the early geologists, the Honna Formation was considered to overlie the Haida Formation in western Skidegate Inlet, the Honna itself being overlain by the Skidegate Formation. Actual contact relations between the three formations are, however, poorly exposed. In Kagan Bay the strata appear to be folded into a broad syncline, with the Skidegate preserved in the centre of the syncline (Sutherland Brown, 1968). Megafossil collections indicate that part of the Skidegate is equivalent in age to the Shale member of the Haida Formation, and that both are older than the Honna Formation.

Haida Formation

Only the Shale member of the Haida Formation was studied in western Skidegate Inlet. The member outcrops on the western end of Lina Island (section A), on the northwest end of Maude Island (section B), on the northwest side of Legace Island (section C), and on the south shore of Kagan Bay.

Both lithofacies of the Shale member described from Cumshewa Inlet, the concretionary shale lithofacies and the interbedded siltstone lithofacies, can also be recognized at western Skidegate Inlet. The thick section exposed on the southwest corner of Lina Island (section A of Fig. 10; equivalent to the upper part of McLearn's (1972) section E) includes 95 m of the concretionary shale lithofacies in its lower part (Fig. 11). Numerous ammonites and inoceramids have been found at several horizons in this section, although most of them are poorly preserved.

A second section of the Shale member was visited on the northwest end of Maude Island (section B of Fig. 10; this section is apparently equivalent to the highest portion of McLearn's (1972) section C of the Haida). At this locality, 43 m of only the concretionary shale facies was observed. The base of this section is a fault zone with associated diabase intrusives. The lower conglomerate of the Honna Formation outcrops a short distance to the west, separated from the top of the section of Shale member by a covered interval, also probably a fault zone.

On the northwest side of Legace Island (section C) a small thickness of concretionary shale, becoming richer in siltstone interbeds near the top of the sequence, is overlain by the cobble conglomerate of the Honna. The upper beds in this section are typical of the interbedded siltstone lithofacies of the Shale member and are probably late Cenomanian based on the occurrence of **Inoceramus** ex gr. **I. pictus** Sowerby (GSC loc. C-137658).

A small outcrop of interbedded shale, siltstone and sandstone was also studied on the south shore of Kagan Bay. This outcrop was previously mapped by Sutherland Brown (1968) as belonging to the Skidegate Formation. The lithological similarity of this outcrop with others of the interbedded siltstone facies of the Shale member of the Haida, however, as well as its distinct contrast with typical outcrops of the Skidegate Formation as exposed on the north shore of Kagan Bay and on Meyer Island (GSC loc. C-137665), suggest that it may be more appropriately considered as Haida Formation.

Skidegate Formation

Strata mapped by Sutherland Brown (1968) as belonging to the Skidegate Formation were examined at several localities. Outcrops visited on Meyer Island and at the northwest end of Kagan Bay are mainly unfossiliferous, consisting of highly indurated, thin-bedded sandstone, siltstone, and shale. In these areas the rocks are strongly

Table 2. Fossil assemblages of the Sandstone member of the Haida Formation, Cumshewa Inlet, displayed in relative stratigraphic positions

	Section A	Central region	Section G
Upper SS mbr	Brewericeras hulenense Marshallites columbianus Pictetia sp.	Puzosia sp.aff. P. dilleri Anagaudryceras sacya D. (Pseudouhligella) dawsoni D. (P.) subezoanum Myloceras ? sp. Marshallites cumshewaensis Pseudhelicoceras carlottense Hypophylloceras aff. H. californicum	
Middle SS mbr	Brewericeras hulenense Anagaudryceras sacya Zelandites cf. Z. perezi Cleoniceras sp. Beudanticeras ? sp. Parasilesites cf. P. laperousianus I. (Birostrina) concentrica I. (Actinoceramus) salomoni	D. (Pseudouhligella) cf. D. (P.) alamoense Tetragonites rectangularis alaskaensis Anagaudryceras sacya Inoceramus moresbyensis I. (Birostrina) concentrica	D. (Pseudouhligella) cf. D. (P.) alamoense Tetragonites rectangularis alaskaensis Puzosia sp.aff. P. dilleri Anagaudryceras sacya Zelandites cf. Z. inflatus Inoceramus moresbyensis
Lower SS mbr		Marshallites columbianus	

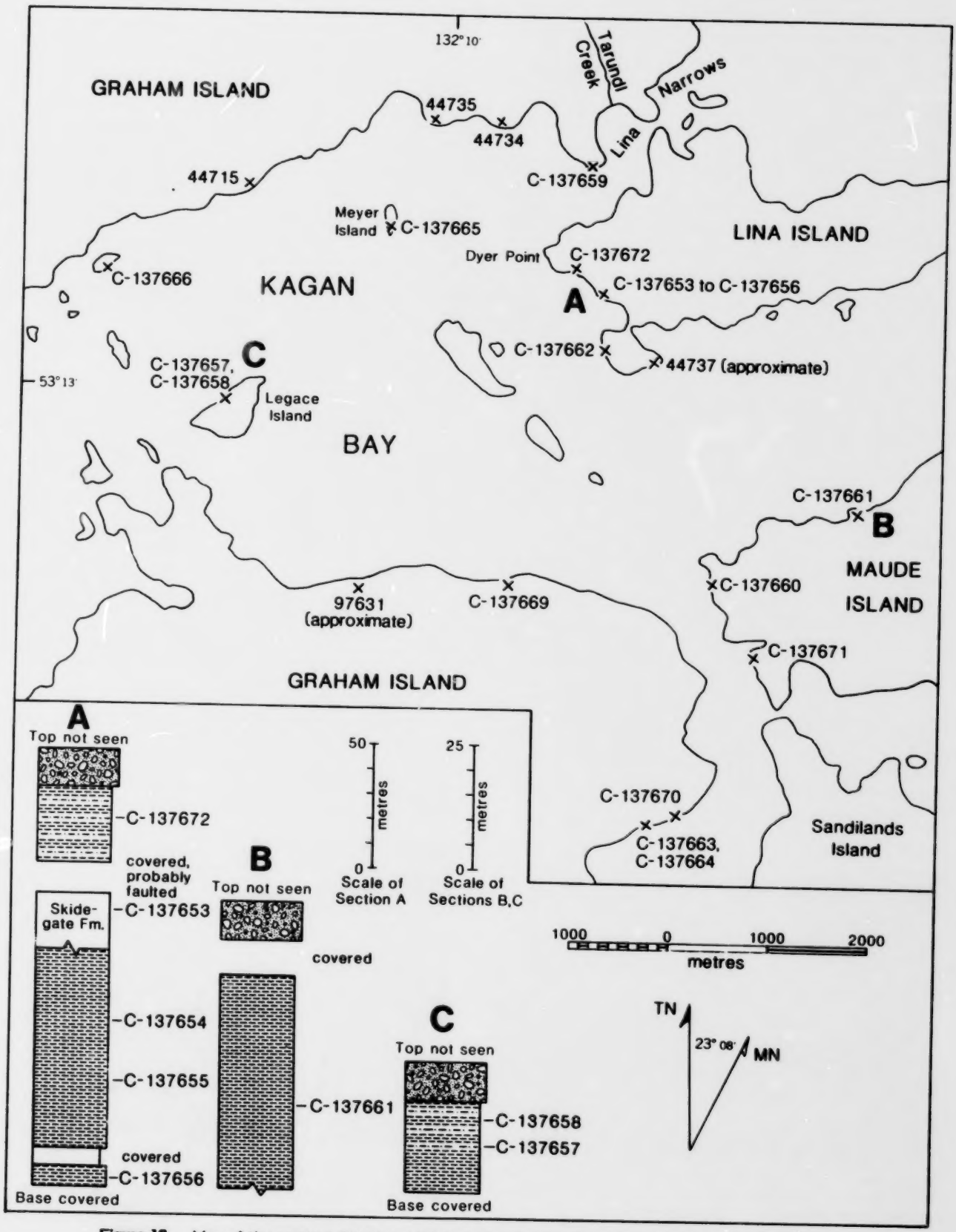


Figure 10. Map of the western Skidegate Inlet region, showing GSC fossil localities and locations of measured sections.

faulted and folded and are diagenetically more altered than the Haida and Honna strata. Other than the degree of diagenetic modification of the Skidegate strata, the formation is not distinctly different in lithology from the interbedded siltstone facies of the Shale member of the Haida, or for that matter, the upper part of the Honna Formation. The Skidegate occurrences in northwestern Kagan Bay do, however, appear to represent a thicker succession of strata than is typically seen in sections of the upper part of the Shale member or the Honna Formation.

Strata near the top of the Lina Island section (section A), and at GSC locality C-137662 on southwest Lina Island are probably best correlated with the Skidegate Formation as well. In section A the strata are apparently in fault contact with beds of the Shale member of the Haida Formation. The strata are of typical Skidegate facies and consist of fissile shale with thinly interbedded fine grained, plane-laminated sandstone, and a few thin calcareous concretionary horizons (Fig. 12a, b). Due to the presence of the bounding faults, it is not completely clear how this short section is related to the outcrops appearing stratigraphically above and below it. However, based on the occurrence of **Inoceramus** sp. cf. **I. multiformis** Pergament, of probable latest Turonian to early Coniacian age, these Skidegate beds are substantially younger than the underlying Cenomanian beds of the Shale member of the Haida. About 100 m to the north of this section, and separated from it by a covered interval, lowermost beds of the Honna Formation outcrop, stratigraphically overlying interbedded siltstone, sandstone, and shale readily identified with the upper part of the Haida Shale member.

At the site on the peninsula of southwest Lina Island (GSC loc. C-137662) the section consists of shales and siltstones of the Shale member of the Haida which grade upward into beds of similar lithology to the Skidegate rocks in section A. Here the Haida Shale rocks contain late Albian or Cenomanian **Inoceramus (Birostrina) concentrica** Parkinson, but no fossils were noted in the highest, Skidegate-type, beds.

Based on the relative lithological similarity of these outcrops of Skidegate type rocks to the Shale member of the Haida, as well as their apparent stratigraphic position within the Shale member sections, I suggest that these beds on Lina Island represent a lateral interfingering of Skidegate Formation strata with the Shale member of the Haida Formation.

Honna Formation

Outcrops of the Honna Formation occur extensively at the type locality near Lina Narrows (Sutherland Brown, 1968) and on the peninsula of Graham Island opposite Maude and Sandilands islands. The Honna directly overlies the interbedded siltstone facies of the Shale member of the Haida Formation on Legace Island; at most other localities visited it is separated from outcrops of the Haida by covered intervals.

The same succession of rock types recognized in the Honna Formation in Cumshewa Inlet can also be recognized in western Skidegate Inlet, although, as noted by Sutherland Brown (1968), the Honna is significantly thicker in the Skidegate Inlet region. Generally, cobble conglomerate overlies the Shale member of the Haida, but at a locality east of Dyer Point on western Lina Island, the basal Honna beds consist of several tens of metres of massive to plane-laminated, medium- to coarse-grained sandstone, with minor pebbles and small lenses of cobble conglomerate interspersed throughout. These beds appear to directly overlie the Haida Shale member, but a fault contact between the two units is possible here, although considered unlikely.

The discontinuous nature of the conglomerate must be emphasized, as it rapidly grades upward and laterally into medium- to coarse-grained, pebbly sandstone and, locally, siltstone and sandy shale with pebbles and cobbles. These sandstone and shale beds rapidly pinch out laterally. At the southern tip of the point west of Tarundl Creek, considered as part of the type locality of the Honna (Sutherland Brown, 1968; Sutherland Brown et al., 1983), bedding surfaces in the sandstones overlying the cobble conglomerate show extensive grazing traces and symmetric ripple marks that are infilled with mud (Fig. 13a, b). The sand bodies contain low-angle, tabular cross-stratification and occasional climbing-ripple cross-stratification (Fig. 13c). Occasional hummocks were noted. At GSC locality C-137659 in this sequence, poorly preserved ammonites were retrieved from shale pockets within the conglomerate and sandstone. The combination of lithologies, sedimentary structures, bioturbation and marine fossils suggests a shallow marine depositional environment for these rocks of the Honna Formation.

At several localities studied in the Maude-Graham-Sandilands islands area, I noted that the upper part of the Honna includes interbedded pebbly sandstone and shale, such as in Cumshewa Inlet. This facies is best displayed in a short section at GSC locality C-137663 on Graham Island opposite Sandilands Island, where a 6 m thick sequence of basal conglomerate is overlain by an 8.5 m thick covered interval. Above the covered interval is 8.5 m of medium- to fine-grained sandstone with some pebbles, interbedded with silty shale. It is possible that the covered interval represents a fault contact, but this is not likely as the beds on either side of the covered interval have nearly identical attitudes.

Biostratigraphy

Several important new collections of megafossils were made from all three formations studied in western Skidegate Inlet. Additionally, the collections made by Sutherland Brown (1968), now housed at the Geological Survey of Canada, were re-examined. A sequence of megafossil faunas ranging in age from latest Albian to Coniacian have been identified from these strata (Table 3).

Desmoceras (Pseudouhligella) dawsoni Zone. **Desmoceras (P.) dawsoni** (Whiteaves) was collected from the middle of the section of the Shale member (concretionary shale lithofacies) exposed on southwestern Lina Island (GSC loc. C-137654). In close stratigraphic proximity to the zonal index are **Inoceramus (Birostrina) concentrica**

Figure 11. The concretionary shale lithofacies of the Shale member of the Haida Formation, western Lina Island (section A), Skidegate Inlet (GSC photo 204324-Y).

Parkinson, **I. cf. I. nipponicus** Nagao and Matsumoto (Plate 1, fig. 2), and **Puzosia skidegatensis** McLearn. A fragment of an ammonite referable to D. (P.) cf. **japonicum** (Yabe) was collected from float at this level. The assemblage of species suggests that this level of the section is latest Albian-earliest Cenomanian in age.

No examples of younger **Inoceramus** aff. **I. incelebratus** or **Mytiloides labiatus** were found in the overlying 28 m of this section and the upper beds are in fault contact with younger strata containing **Inoceramus** sp. cf. **I. multiformis.**

Mytiloides labiatus Zone. A single, well preserved example of **Mytiloides labiatus** (Schlotheim) s.l. was found in the Survey collections (Plate 1, fig. 5). The specimen was collected by Sutherland Brown from the Skidegate Formation in the central part of the syncline in Kagan Bay (GSC loc. 44715) and identified by McLearn (unpublished report) as **Inoceramus** sp. (Sutherland Brown, 1968, p. 104). No other fossils have been found at this locality. If this locality is indeed the centre of the syncline within the Skidegate Formation as suggested by Sutherland Brown (1968), it suggests that the upper part of the Skidegate at the type locality is early Turonian in age.

A Turonian age for part of the Skidegate has previously been suggested. Dawson (1880, p. 64-65) noted that "the highest rocks seen in Skidegate Inlet . . . contain few fossils, the only form recognized being **Inoceramus problematicus.**" Whiteaves (1884, p. 193) also referred to Dawson's specimens from the Skidegate as **I. problematicus**, noting that the species was typical of the European Turonian; he subsequently accepted the name **I. labiatus**, based on contemporary European usage for that species (1889, p. 186).

Inoceramus sp. cf. **I. multiformis** Fauna. **Inoceramus** sp. cf. **I. multiformis** Pergament (Plate 1, fig. 6) was collected from Skidegate-type rocks at GSC locality C-137653 on Lina Island (section A). Riccardi (1981) also identified this species in a collection made by Sutherland Brown in 1960 from southwest Lina Island (GSC loc. 44737). This locality is listed as occurring in the basal Honna beds but I was unable to verify the actual location. This species occurs in the lower Coniacian of the Pacific regions of the USSR (Pergament, 1971, 1978) and similar, closely-related, species are known from the upper Turonian and Coniacian of Japan and Europe (summarized in Riccardi, 1981). Other inoceramids were collected from the Skidegate Formation at GSC locality C-137666, which show the coarse rugae typical of northwestern Pacific, Coniacian inoceramids (Pergament, 1971), but these are of too poor quality for identification. A general latest Turonian to early Coniacian age is thus suggested for the **I.** sp. cf. **I. multiformis** fauna.

Peroniceras (s.s.) sp. Fauna. Several fragments and one well preserved mould of **Peroniceras** (s.s.) sp. (Plate 1, fig. 8) were obtained from the uppermost conglomerate of the lower part of the Honna Formation near Lina Narrows (GSC loc. C-137659). The fossils were collected from a shale pocket within an interval of sandstone with cobbles. **Peroniceras** is considered a mid-Coniacian genus, occurring worldwide, including California and Japan (Klinger and Kennedy, 1984). The presence of **Peroniceras** within the Honna Formation is the first direct evidence of Coniacian strata on the Pacific Coast of Canada.

Other collections. Megafossils were collected at other localities of the Honna and Skidegate formations. From the Skidegate exposed on Meyer Island a fragment referred to the heteromorph ammonite genus **Stomohamites**? (Plate 1, fig. 9) was collected at GSC locality C-137665. **Stomohamites** ranges from the upper Albian to lower Turonian (Kennedy, 1971). Although megafossils are sparse in the Skidegate, a general Cenomanian to lower Coniacian age is suggested, and **M. labiatus** firmly denotes the presence of lower Turonian strata in the formation.

A partial mould of an ammonite was collected from the Honna Formation on the south shore of Kagan Bay (GSC loc. 97631) by Survey geologists who suggested it came from the upper part of the formation. The specimen was identified by Riccardi (1981) as **Plesiotexanites** (?) sp. indet. and he suggested a Santonian age for the uppermost Honna based on this specimen. A search of the south shore of Kagan Bay produced no additional fossils and after examining the Honna outcrops in this region I consider them to represent a lower level in the Honna as they include coarse sandstone and conglomerate. While **Plesiotexanites** does occur in the Santonian, examples of the genus are also known from the upper Coniacian of Japan (Matsumoto and Haraguchi, 1978) and California (Jones, 1966; Haggart, 1984).

The occurrence of **Peroniceras** sp. and **Plesiotexanites** (?) sp. indet. in the Honna Formation indicates a later Coniacian age for the unit. At these localities, the Honna is thus younger than the Skidegate Formation at its type locality in Kagan Bay.

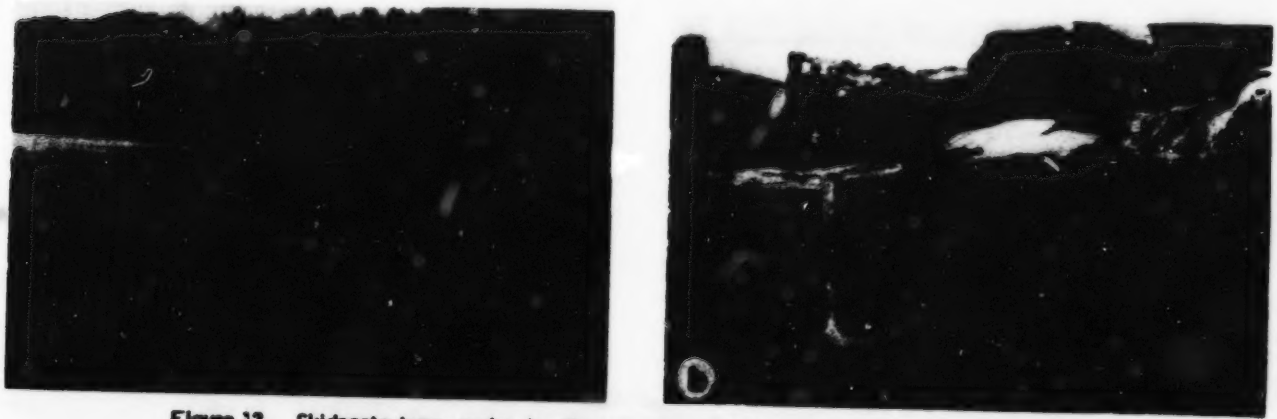


Figure 12. Skidegate-type rocks in the upper part of section A, western Lina Island. **a)** Interbedded, plane-laminated sandstones and shales (GSC photo 204384-D). **b)** Sandstone beds (GSC photo 204324-X).

BERESFORD BAY REGION

Cretaceous strata in the southern Beresford Bay region of northwestern Graham Island were briefly studied over a three day period (Fig. 14). Outcrops occur in the intertidal zone at the mouth of the unnamed creek east of Caswell Point; upstream from the mouth of Beresford Creek; and on the north side of the point formed by Pyramid Hill, south of Beresford Creek. These strata were originally mapped as Haida Formation by Sutherland Brown (1968, Fig. 5, sheet C). No fossil collections have previously been reported from these strata, thus their true ages were inferred. New paleontological material indicates a late Albian age for these rocks, confirming their lithostratigraphic identification as Haida sediments.

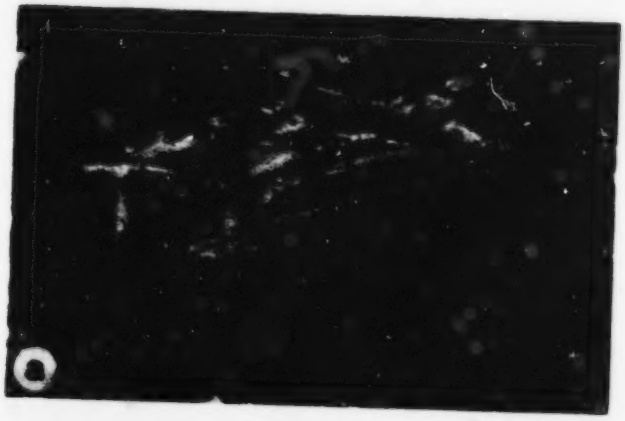
Caswell Point section

The section exposed in the intertidal zone at the mouth of the unnamed creek east of Caswell Point contains numerous ammonites at several horizons. Although the top of this section was not reached due to the fact that it dips beneath the sea, 269 m of strata were measured by Brunton compass and pacing. The strata are well exposed and show evidence of only minor faulting and intrusion.

The lower 110 m of beds in this section consist of thick, coarse grained, quartz-rich, orange-tan to olive-grey sandstone. The rocks include minor amounts of pebbles up to 2 cm in diameter, usually found singly in the matrix. These sandstones commonly exhibit planar and trough cross-stratification and many are concretionary, the iron-rich concretions weathering black (Fig. 15a). Very thin (up to 4 cm), laterally discontinuous coal seams occur at several horizons. A single, poorly preserved ammonite was recovered from these basal sandstone beds (GSC loc. C-137613), but no other molluscan fossils were noted.

These sediments are interpreted to have been deposited in a lagoonal setting. The contact of the Cretaceous with the basement rocks was not observed, but elsewhere in the Beresford Bay region, Cretaceous strata unconformably overlie Triassic-Jurassic metasedimentary rocks (Sutherland Brown, 1968, Fig. 5, sheet C.) The lagoonal deposits at the base of the Caswell Point section may represent earliest deposition on the basement rocks in this area of the coast.

The uppermost 115 m of strata in the Caswell Point section consist of rocks similar in lithology to the basal beds but with increasing amounts of fine grained sandstone and siltstone and minor, laterally discontinuous, mudstone interbeds. Repetitive sequences of coarse grained sandstone fining upward into siltstone are noted in the highest part of the studied section. The siltstones are locally concretionary and well bioturbated as no laminae were noted. The presence of fine grained clastics, bioturbation and common ammonites, as well as the absence of coal horizons in these sediments indicates a deepening of waters in this area as a result of continuing transgression. Based on lithology, the strata preserved in the Caswell Point section are comparable to the Sandstone member of the Haida Formation.



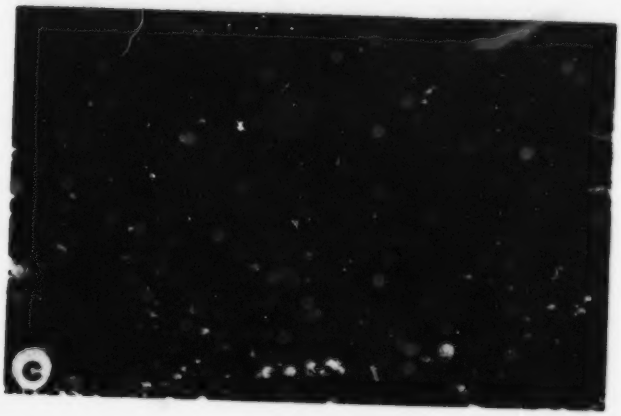


Figure 13. Honna Formation at point west of Tarundl Creek, Skidegate Inlet. **a)** Symmetric ripple marks preserved on basal surface of sandstone bed (GSC photo 204324-F). **b)** Grazing traces on upper surface of sandstone bed (GSC photo 204384-F). **c)** Climbing-ripple and low-angle-planar cross-stratification in sandstone beds (GSC photo 204384-I).

Beresford Creek section

Newly recognized outcrops of Cretaceous strata occur more or less continuously along the south bank of Beresford Creek for several hundred metres upstream from its mouth. The strata dip moderately to the southwest and the stratigraphically lowest exposures studied occur at the upstream limit of tidal influence, although the base of the section was not observed. The section consists of approximately 175 m of mudstone and silty mudstone, with minor, fine grained sandstone beds up to 8 cm thick. The mudstones are black at the base of the section, becoming lighter in colour, almost bluish, higher up. Small, sideritic concretions occur throughout the section, but the highest beds are characterized by several horizons of large, nodose, calcareous concretions, nearly all fossiliferous. Although minor amounts of pyrite were noted in some of the calcareous and sideritic concretions, the sediments appear to have been well-oxygenated, as bioturbation has obscured all depositional laminae.

The sedimentary rocks are well preserved in the lower and upper third of the section, showing no evidence of igneous intrusions. The middle portion, however, shows some evidence of shearing. In lithological character these mudstones are similar to the Shale member of the Haida Formation in Skidegate and Cumshewa inlets.

Pyramid Hill tidal bench section

Approximately 1350 m southwest of the mouth of Beresford Creek, another section of Cretaceous strata is exposed on the coast west of Pyramid Hill. The strata here are exposed only at low tide, as the contact with the overlying Paleocene to Eocene Masset Formation volcanics occurs below the high tide level. The Cretaceous strata outcrop over a very wide expanse (Fig. 15b), dipping to the southwest. Although an aerial view indicates that faulting offsets some beds in the section, such offset is minor and the section does not appear to show significant repetition or loss of beds. Approximately 207 m of well exposed strata were measured by pacing, and another 81 m are represented in a poorly exposed interval below this section. In addition, approximately 100 m of strata were observed overlying the measured section, but these were not studied.

Strata in the Pyramid Hill tidal bench section consist of indurated shale and argillite interbedded with sandstone beds that are up to 75 cm in thickness. Although igneous intrusions in the section are rare, the sediments have experienced some degree of metamorphic alteration, perhaps from the closely overlying Masset volcanics, making discrimination of sedimentological details difficult in the finer grained facies. The sandstone beds are medium- to fine-grained, locally graded, and show basal, parallel laminae

Table 3. Fossil occurrences in western Skidegate Inlet region

	GSC Locality Number														
	Haida Formation Shale Member						Skidegate Formation					Honna Formation				
	C-137654	C-137655	C-137656	C-137661	C-137662	C-137658	44734	C-137665	C-137666	44715	C-137653	44737	C-137659	C-137660	C-137663	C-137664	97631
Plesiotexanites sp.indet.																	
Inoceramus sp.cf. I. multiformis Pergament																	X
I. cf. I. australis Woods (sensu Pergament)											X	X					
Peroniceras sp.indet.														X			
Mytiloides labiatus (Schlotheim) s.l.													X				
Inoceramus sp.										X							
Stomohamites? sp.								X	X						X	X	
Graysonites? sp. [juv]								X									
Inoceramus ex gr. I. pictus Sowerby							X										
Tetragonites? sp.				X		X											
Hypophylloceras sp.						X											
I. (Birostrina) concentrica Parkinson			X		X	X											
Marshallites cf. M. cumshewaensis (Whit.)				X													
Anagaudryceras sacya (Forbes)			X														
Ammonoceratites crenocostatus (Whit.)?			X														
I. cf. I. nipponicus Nagao & Matsumoto			X														
D (Pseudouhligella) japonicum (Yabe)			X														
D. (P.) dawsoni (Whiteaves)		X															
Puzosia skidegatensis McLearn			X														

succeeded by ripple laminae, and convolutions in their upper parts (Fig. 15c). The shales are poorly fossiliferous except where concretionary. From these concretions ammonites were collected, mainly as float. The sandstone beds are suggestive of deposits of turbidite origin and the common presence of ammonites indicates a shelf environment. These strata appear lithologically similar to the Shale member of the Haida Formation.

A small outcrop of sandstone with minor mudstone and siltstone occurs midway between the Beresford Creek section and the Pyramid Hill tidal bench section. The strata here also dip gently to the west. Extrapolating geometrically, the total thickness of strata of the Shale member preserved in southern Beresford Bay, from the lowest beds of the Beresford Creek section to the highest shale beds of the Pyramid Hill tidal bench section, is in the order of 800 m.

Biostratigraphy

A summary of the fossil occurrences in the southern Beresford Bay region is given in Table 4. Ammonites collected from the upper part of the Caswell Point section (GSC loc. C-137611, C-137612) include **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves), **D. (P.) subezoanum** McLearn, **Myloceras**? sp., **Hypophylloceras** aff. **H. californicum** (Anderson), **Anagaudryceras sacya** (Forbes), **Ptychoceras (Diptychoceras) glaber** (Whiteaves), **Tetragonites rectangularis alaskaensis** Murphy, **Ammonoceratites crenocostatus** (Whiteaves)? and **Marshallites cumshewaensis** (Whiteaves).

The lowest part of the Beresford Creek section is barren of molluscs. Localities clustered in the upper 55 m of the section (GSC loc. C-137606 to C-137610) yielded the ammonites **Anagaudryceras sacya** (Forbes), **Anagaudryceras** cf. **A. filicinctum** (Whiteaves), **Myloceras**? sp., **Puzosia** cf. **P. dilleri** (Anderson), **Ammonoceratites crenocostatus** (Whiteaves)?, **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves), **D. (P.) subezoanum** McLearn, **Pseudhelicoceras carlottense** (Whiteaves), and **Zelandites** aff. **Z. inflatus** Matsumoto.

The ammonites collected from the Pyramid Hill tidal bench section (GSC loc. C-137615) include **Ptychoceras (Diptychoceras) glaber** (Whiteaves), **Anagaudryceras sacya** (Forbes), **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves), **D. (P.) subezoanum** McLearn, **Myloceras**? sp., **Tetragonites** aff. **T. kitchini** (Krenkel), **Marshallites** cf. **M. cumshewaensis** (Whiteaves), and **Hypophylloceras** aff. **H. californicum** (Anderson).

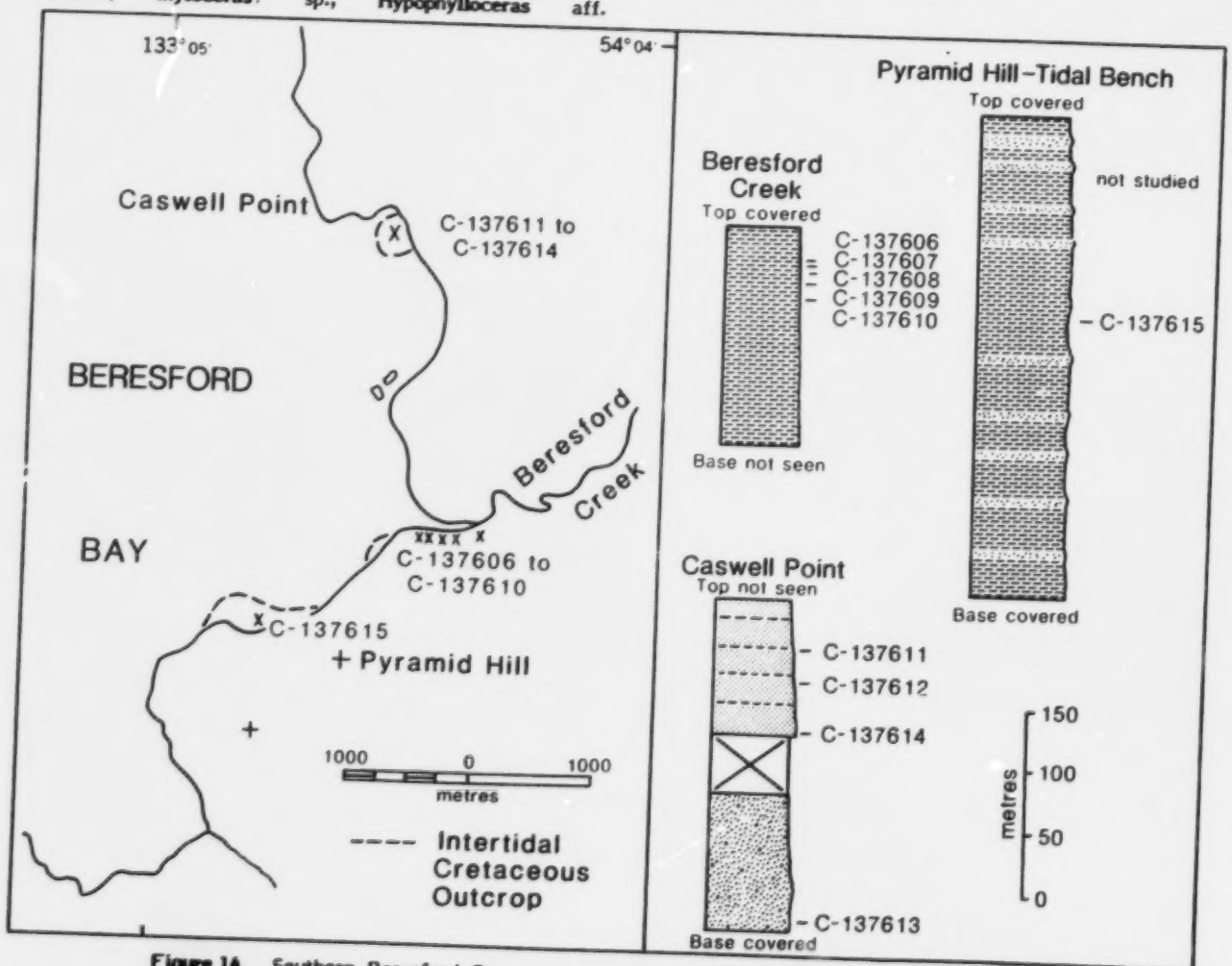


Figure 14. Southern Beresford Bay region showing location of GSC fossil localities and measured sections.

All three of the sections studied in the southern Beresford Bay region contain **Desmoceras (Pseudouhligella) dawsoni** (Whiteaves) of latest Albian age. However, **Mortoniceras** was not collected at any of the localities. No taxa of the older Albian **Cleoniceras (Grycia) perezianum, Brewericeras hulenense** or **Brewericeras lecontei** zones have been found here as well, although Jones et al. (1965) reported **Brewericeras lecontei** from strata outcropping several kilometres north of Caswell Point, near Fleurlieu Point. No examples of D. (P.) **japonicum** (Yabe) were collected from the sections either; therefore, the presence of lower Cenomanian strata in the area has not yet been demonstrated.

As discussed above, the lower part of the section at Caswell Point is a very shallow water facies. The collection of D. (P.) **dawsoni** from the middle of the section indicates that transgression at this locality commenced in the later Albian. At the sections along Beresford Creek and near Pyramid Hill, however, latest Albian strata are represented by deeper shelf deposits. The Caswell Point region may thus have been a topographic high, inundated only in the latest Albian. This suggests that either a steep shelf existed between the two localities in the latest Albian, or they have subsequently been juxtaposed by lateral fault movement, as has occurred along the Beresford Bay Fault to the north (Sutherland Brown, 1968).

CONCLUDING REMARKS

Distinctive lithofacies associations can be recognized in strata of the Haida and Honna formations in Cumshewa and western Skidegate inlets. Five lithofacies occur in the Haida Formation in Cumshewa Inlet which reflect initial marine transgression in the area followed by gradual deepening to outer-shelf conditions. The uppermost facies recognized within the Haida in Cumshewa Inlet appears to represent the initial progradation of coarse clastics into the basin. Outcrops of the facies are overlain by conglomerates of the Honna Formation.

Six megafossil faunas and zones are recognized within the Haida Formation in Cumshewa Inlet, ranging in age from late early Albian to early Turonian (Table 5). The lack of any examples of **Douvilleiceras** spp. in upper lower Albian strata containing **Brewericeras hulenense** in Cumshewa Inlet is unusual as several species of **Douvilleiceras** occur commonly in the zone of **B. hulenense** in Skidegate Inlet. **Douvilleiceras spiniferum** (Whiteaves), D. sp.a McLearn, and D. sp.b McLearn all occur with **B. hulenense** in sections of the Sandstone member of the Haida on Maude, Lina, Robber, and Bush islands (McLearn, 1972). Indeed, the presence of **Douvilleiceras** in this zone has allowed confident correlation of the **B. hulenense** Zone with the upper lower Albian (in the sense of Spath, 1923-1943) of the European standard sequence. However, no examples of **Douvilleiceras** were

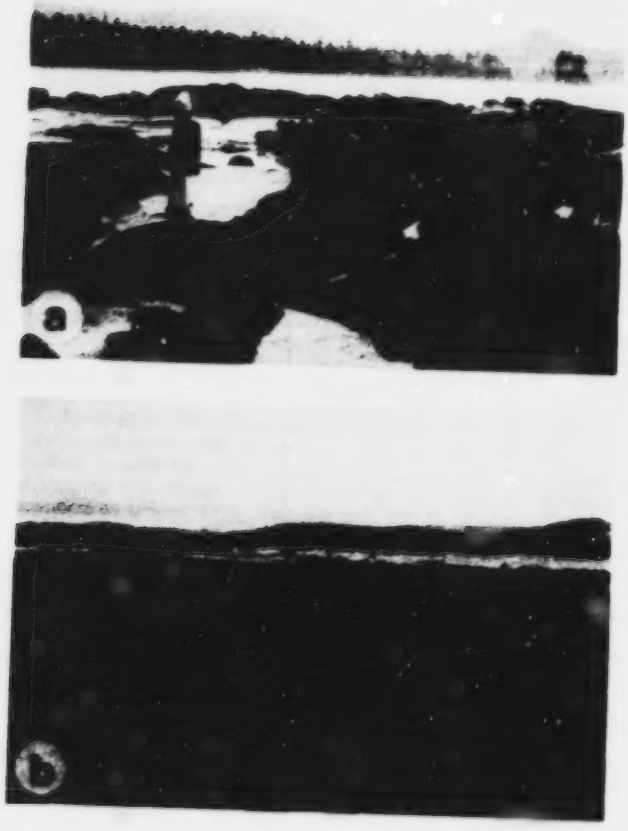


Figure 15. Haida Formation, southern Beresford Bay region. **a)** Massive, coarse grained concretionary sandstones in lower part of section at Caswell Point (GSC photo 204324-E). **b)** Tidal bench west of Pyramid Hill showing southwestward-dipping shales with interbedded concretionary sandstone horizons, pack for scale at left (GSC photo 204324-B). **c)** Typical sandstone interbed in section of photo b), showing basal parallel laminations succeeded by convolute laminations (GSC photo 204384-E).

Table 4. Fossil occurrences in southern Beresford Bay region

FOSSILS	GSC Locality Number									
	Caswell Point				Beresford Creek					PHTB
	C-137611	C-137612	C-137613	C-137614	C-137606	C-137607	C-137608	C-137609	C-137610	C-137615
Anagaudryceras cf. A. filicinctum (Whiteaves)					X					
Anagaudryceras sacya (Forbes)				X	X					X
Anagaudryceras sp.				X						
Desmoceras (Pseudouhligella) dawsoni (Whiteaves)	X	X	?	X	X			X		X
Desmoceras (Pseudouhligella) subezoanum McLearn				X	X	X				X
Desmoceras (Pseudouhligella) sp.					X		X			
Hypophylloceras aff. H. californicum (Anderson)				X						X
Marshallites cumshewaensis (Whiteaves)				X						
Marshallites cf. M. cumshewaensis (Whiteaves)									X	X
Myloceras? sp.	X	X		X	X				X	X
Pictetia sp.				X	X					
Pseudhelicoceras carlottense (Whiteaves)					X					
Ptychoceras (Diptychoceras) glaber (Whiteaves)				X						X
Puzosia cf. P. dilleri (Anderson)					X					
Tetragonites sp.aff. T. kitchini (Krenkel)										X
Tetragonites rectangularis alaskaensis Murphy										
Zelandites aff. Z. inflatus Matsumoto			X				X			

Table 5. Comparison of faunal successions observed in Cumshewa Inlet, eastern and western Skidegate inlets, and southern Beresford Bay region

		Cumshewa Inlet	Eastern Skidegate Inlet (after McLearn, 1972; Sutherland Brown, 1968)	Western Skidegate Inlet	S. Beresford Bay
TURONIAN	Peroniceras sp. Fauna			X	
	I. sp.cf. I. multiformis Fauna			X	
	Mytiloides labiatus Zone	X	X	X	
CENOMANIAN	I. aff. I. incelebratus Fauna	X			
	D. (P.) japonicum Zone	X	X	?	
ALBIAN	D. (P.) dawsoni Zone	X	X	X	X
	Cleoniceras perezianum Fauna	X	X		
	Brewericeras hulenense Zone	X	X		

collected from the **B. hulenense** Zone in the Dawson Cove section, which is also reasonably fossiliferous and of similar facies to the Skidegate Inlet sections. McLearn's listed occurrences of **Douvilleiceras** spp. in Skidegate Inlet are always in association with **B. hulenense**, except at Robber Point, McLearn's site D16, low in the Sandstone member of the Haida. The two taxa do co-occur nearby, on Robber Island, McLearn's locality D17. As also reported by McLearn, **B. hulenense** occurs without **Douvilleiceras** spp. at several localities in the Maude Island sections, localities which appear to be stratigraphically higher than those where the two genera are both represented (see McLearn, 1972, Fig. 2, loc. C7, D3, D4, and E7). It is thus possible that the occurrence of the species of **Douvilleiceras** in Skidegate Inlet form a local range zone contained within the zone of **B. hulenense**, thus denoting a subzone within that zone. If such is the case, **B. hulenense** may locally range upward into the middle Albian (sensu Spath, 1923-1943) in the Queen Charlotte Islands area. The lack of any representatives of **Douvilleiceras** in the **B. hulenense** Zone in Cumshewa Inlet would thus suggest that these beds of the Dawson Cove section are correlative with the upper part of the **B. hulenense** Zone in Skidegate Inlet.

At all localities where **D. (P.) dawsoni** has been collected in Cumshewa Inlet and Beresford Bay examples of **Mortoniceras** are conspicuously absent. While **Mortoniceras** occurs commonly in California, it has been collected only from the **Mortoniceras-Desmoceras (Pseudouhligella) dawsoni** Zone in eastern Skidegate Inlet on the Queen Charlottes and it does not occur farther north in Alaska (Jones, 1973). Thus, **Mortoniceras** appears to have penetrated local regions of the northern part of the eastern Pacific for only a brief period of time in the late Albian. It is possible that the ranges of **Mortoniceras** and **D. (P.) dawsoni** overlap only in the lowermost upper Albian with the acme occurrence of **Mortoniceras** occurring below that of **D. (P.) dawsoni**. If such is the case it may be of value to discriminate a lower, **Mortoniceras** subzone within the **Mortoniceras-Desmoceras (Pseudouhligella) dawsoni** Zone of McLearn (1972).

The reported occurrences of **Mytiloides labiatus** in the basal Honna Formation in Cumshewa Inlet are most likely from the uppermost Shale member of the Haida. Thus, the outcrops of the Honna in Cumshewa Inlet, which are unfossiliferous, are probably younger than early Turonian. Since the Honna is early Coniacian in Skidegate Inlet, in all likelihood a late Turonian hiatus is represented between the Honna and the youngest, early Turonian beds of the Shale member of the Haida in Cumshewa Inlet.

Several of the megafossil zones and faunas recognized in the Haida and Honna rocks of Cumshewa Inlet also occur in western Skidegate Inlet (Table 5). Strata of the Shale member of the Haida in this region contain the ammonites **Desmoceras (Pseudouhligella) dawsoni** and **D. (P.) japonicum**, indicating a late Albian to Cenomanian age, but early Turonian **Mytiloides labiatus** has not yet been recovered from the Shale member in the western inlet. **M. labiatus** does, however, occur in strata of the Skidegate Formation at its type locality, indicating an early Turonian age for those beds. The occurrence of probable Albian (?) and Cenomanian ammonites and inoceramids in other outcrops of the Skidegate Formation suggests its general age equivalence with the Haida Shale member. At still other areas in western Skidegate Inlet, strata very similar in lithology to the type Skidegate Formation rocks appear to interfinger with the Shale member of the Haida. These Skidegate rocks contain late Turonian to early Coniacian **Inoceramus** sp. cf. **I. multiformis**. Thus, the Skidegate Formation in Skidegate Inlet appears to include Cenomanian to lower Coniacian strata.

The Honna Formation is more fossiliferous in Skidegate Inlet than in Cumshewa Inlet and the occurrence of **Inoceramus** sp. cf. **I. multiformis** in its basal beds (Riccardi, 1981), and **Peroniceras** (s.s.) from the upper part of the basal conglomerate, indicates a Coniacian age for that part of the formation. This is in general agreement with the occurrence of **Plesiotexanites** sp. indet., of Coniacian – Santonian age, at a similar level. The Honna appears to be younger than both the Haida and the Skidegate, and probably represents the final phase of Cretaceous deposition in the region. No fossil data support Jeletzky's (1977, p. 121) correlation of the Honna Formation with the late Santonian basal beds of the Nanaimo Group on southern Vancouver Island.

The occurrence of **Inoceramus** sp. cf. **I. multiformis** in both the basal Honna and the apparently underlying Skidegate beds on Lina Island, Skidegate Inlet, indicates that a significant hiatus between deposition of the Haida and Skidegate, and the overlying Honna, did not occur in the Skidegate Inlet region. In Cumshewa Inlet, however, unfossiliferous Honna conglomerates overlie early Turonian strata of the Shale member. Thus, in this area, a substantial hiatus may be represented between the two units, or alternatively, deposition of the Honna in this area may have commenced earlier than in western Skidegate Inlet.

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